EFFECTIVENESS OF STRUCTURED TEACHING PROGRAMME ON SELF MANAGEMENT OF TYPE 2 DIABETES MELLITUS AMONG PATIENTS WITH TYPE 2 DIABETES MELLITUS.

Dissertation Submitted To

THE TAMILNADU DR.M.G.R MEDICAL UNIVERSITY CHENNAI

IN PARTIAL FULFILMENT OF REQUIREMENT FOR THE AWARD OF

DEGREE OF

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A STUDY TO ASSESS THE EFFECTIVENESS OF STRUCTURED TEACHING PROGRAMME ON SELF MANAGEMENT OF TYPE 2 DIABETES MELLITUS AMONG PATIENTS WITH TYPE 2 DIABETES MELLITUS IN ESI HOSPITAL AT AYANAVARAM, CHENNAI 2010-2011.

Certified that this is the bonafide work of

Mrs. RENUKA DEVI.R
MADHA COLLEGE OF NURSING,
MADHA NAGAR, KUNDRATHUR,
CHENNAI – 600 069.

COLLEGE SEAL:

SIGNATURE: _____

Prof. TAMILARASI.B
R.N., R.M., M.Sc,(N)., Ph.D.,
Principal,
Madha College of Nursing,
Kundrathur,
Chennai - 600 069, TamilNadu.

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Approved by the dissertation committee on: _____

Research Guide : _____

Prof. TAMILARASI.B
R.N., R.M., M.Sc,(N)., Ph.D.,
Principal,
Madha College of Nursing,
Kundrathur,
Chennai - 600 069, TamilNadu.

Clinical Guide : _____

Mrs. VATHANA.V,
R.N.,R.M., M.Sc,(N).,
Reader,Medical SurgicalNursing,
Madha college of Nursing,
Kundrathur,
Chennai – 600 069, TamilNadu.

Medical Guide : _____

Dr. KUMAR.S,
D.T.R.D.,M.D,(GeneralMedicine),
Civil Surgeon, Regd. No. 41513,
Government Hospital,
Tambaram Sanatorium,
Chennai-600 047, TamilNadu.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ABSTRACT

India leads the world with largest number of diabetic patients. India is termed as “Diabetes capital of the world”. This disease not only affects the quality of life of the patient, but also increases the health expenditure to the individual and at large to the society. Diabetes self management education is the ongoing process of facilitating the knowledge, skill, and ability necessary for diabetes self care.

A study was conducted to assess the effectiveness of structured teaching programme on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus in ESI hospital at Ayanavaram, Chennai, 2010-2011. The hypothesis formulated was that there was no significant relationship between the structured teaching programme and level of knowledge on self management of type 2 diabetes mellitus. The review of literature included the related studies which provide a strong foundation for the study including the basis for conceptual framework and formation of tool.

The research design used in this study was pre experimental one group pre test post test design. It was carried out with 60 samples who fulfilled the inclusive criteria. convenient sampling technique was used to select the samples. An interview schedule was conducted to the patients to assess the pre test level of knowledge. Structured teaching programme was given to the patients for the duration of 20 to 30 minutes. The post test was conducted after one week by using the same tool.

The analysis revealed that the pre test mean score was 17.73 with the standard deviation of 6.560 and the post test mean score was 32.20 with the standard deviation of 2.265. The projected ‘t’ value was 13.036 which showed highly significant at $p<0.001$ level. The analysis revealed that there was an increase in post test level of knowledge, thus it indicates the effectiveness of structured teaching programme. So the null hypothesis was rejected and research hypothesis was accepted for this study.

CHAPTER-I

INTRODUCTION

"Health is wealth"

According to World Health Organization in 1948, Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. Diabetes mellitus, a term that means "the running through of sugar". The disease was described in old books as "the melting down of flesh into urine."

Diabetes mellitus type 2 or type 2 diabetes which was formerly called as non-insulin-dependent diabetes mellitus, or adult-onset diabetes. It is a disorder that is characterized by high blood glucose in the context of insulin resistance and relative insulin deficiency. This high blood sugar produces the classical symptoms of polyuria, polydipsia and polyphagia. Type 2 diabetes mellitus results from insulin resistance, a condition in which cells fail to use insulin properly, sometimes combined with an absolute insulin deficiency.

Diabetes continues to grow at an alarming rate, affecting millions of people around the world. The disease takes its name from the Greek for "passing through" because of one of its main symptoms - excessive urine production. During the fifteenth century the word Mellitus is derived from the Latin for "honey" when it was noted that many patients with diabetes had high levels of sugar in their blood and urine.

According to Centre for Disease Control, diabetes affects over 150 million people worldwide and this number is expected to double by 2025. According to the World Health Organization estimates, India had 32 million diabetic patients in the year 2000 and this number would increase to 80 million by the year 2030. The International Diabetes Federation also reported that the total number of diabetic patients in India is 41 million in 2006 and that this would rise to 70 million by the year 2025.

According to Decision Resources, one of the world's leading research and advisory firms found that, the prevalence of type 2 diabetes mellitus in India is among the highest in the world, more than 28 million cases in 2007. Prevalence will grow more rapidly in India than in any other developing or developed nation, climbing to more than 60 million cases by 2017. They also emphasized that, it is imperative to encourage persons who are at risk to seek medical attention and to improve screening practices in India. So that, the patients can be identified long before they develop diabetic complications.

The Chennai Urban Population Study which looked at the prevalence of diabetes mellitus in two socioeconomic classes in Chennai. The overall prevalence of type 2 diabetes mellitus was 12% in the population aged above 20 years. The middle income group had the rate of 12.4% significantly higher prevalence of type 2 diabetes mellitus compared to the low income group which had 6.4% in the year 2003. The Chennai Urban Rural Epidemiology Study (2006) showed a prevalence of 15.5% in Chennai.

The health problems associated with diabetes mellitus are arterial hypertension, overweight, ischemic cardiopathy, cardiac infarction, cerebro-vascular accidents, diabetic foot ulcers, damage to eyes and secondary chronic renal failure. The complications of diabetes have profound effect on the health, life, life-expectancy and finance of its victims. The direct cost of management of diabetes and its complications is estimated to be 116 billion dollars.

The rising incidence of diabetes mellitus and its complications are going to pose a grave health care burden on our country. Timely effective interventions or measures and screening tests for complications at the time of diagnosis become imperative not only for early detection, but also to prevent progression to end stage disease. Simple interventional strategies like ***"****Eat less, Eat on time and Walk more"* can go a long way in preventing these chronic disorders among present as well as in the future generations.

NEED FOR THE STUDY

Diabetes mellitus represents a spectrum of metabolic disorders, which has become a major health challenge worldwide. The unprecedented economic development and rapid urbanization in Asian countries, particularly in India has led to a shift in health problems from communicable to non-communicable diseases. Diabetes mellitus is pandemic in both developed and developing countries. For a person of low economic standing in India, diabetes mellitus care can account for 25% or more of their family income for each person with diabetes mellitus. The management of long-term complications of diabetes is costly and also leads to enormous productivity losses with significant social burden to the patient and family.

In India alone, the prevalence of diabetes is expected to increase from 31.7 million in 2000 to 79.4 million in 2030. These estimates are valid only if the prevalence of obesity remains the same. Since the incidence of obesity is rising at an alarming rate in developed and developing countries, the projections for the number of diabetes mellitus could well be a gross underestimation.

India has the largest number of diabetics in the world. The Government of India has rightly launched the national program for control of diabetes, cardiovascular diseases and stroke in January 2008. The responsibility of keeping our present as well as future race free from preventable diseases like diabetes, hypertension and coronary heart diseases lies on each and every one of us.

"Prior preparation prevents poor performance"

Once diabetes is diagnosed, the first step is usually to visit a doctor for instruction on lifestyle changes, medications, and daily blood tests. Since there is no cure, only treatments to control it and delay its devastating effects. People with type 1 or type 2 diabetes mellitus have an increased risk of severe complications if the disease goes undiagnosed and untreated, or if it is poorly managed.

Diabetes is the most common metabolic disorder in Indian community. It is a silent disease that has become more prevalent with increased age. Despite the

advances in understanding the disease and its management, the mortality and morbidity of the disease is increasing. Many causes have been postulated for this rise, such as poverty, non-compliance, and poor follow-ups. Poorly controlled diabetes mellitus leads to damage of end organs such as kidneys, heart, brain, and eyes. This disease not only affects the quality of life of the patient but also increases the health expenditure to the individual and at large to the society.

"Prevention is better than cure"

During the clinical posting, the researcher found that many patients got admitted in the hospital with type 2 diabetes mellitus and for its complications like diabetic foot ulcer, hyperglycemia, hypoglycemia, renal failure and heart diseases. The investigator found that these patients do not have adequate knowledge on self management of type 2 diabetes mellitus and developed many complications. So the researcher wanted to carryout a study to impart knowledge to these patients with type 2 diabetes mellitus regarding diabetes mellitus, to practice self care and to encourage the behavioural lifestyle modifications.

STATEMENT OF THE PROBLEM

A study to assess the effectiveness of structured teaching programme on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus in ESI hospital at Ayanavaram, Chennai.

OBJECTIVES

1. To assess the pretest level of knowledge on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus.

2. To assess the post test level of knowledge on self management of type diabetes mellitus among patients with type 2 diabetes mellitus.

3. To assess the effectiveness of structured teaching programme on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus.

4. To associate the pre test and post test level of knowledge on self management of type 2 diabetes mellitus with selected demographic variables among patients with type 2 diabetes mellitus.

OPERATIONAL DEFINITIONS

Effectiveness : Refers to the outcome of structured teaching programme regarding self management of type 2 diabetes mellitus.

Structured teaching programme : Refers to a planned teaching schedule that contains information regarding self management of type 2 diabetes mellitus.

Self management : Refers to the management practices adopted by the patients with type 2 diabetes mellitus themselves.

Type 2 diabetes mellitus : Refers to a disorder characterized by high blood glucose level due to insulin resistance and insulin deficiency.

HYPOTHESIS

There is no significant association between structured teaching programme and the level of knowledge on self management of type 2 diabetes mellitus.

DELIMITATIONS

- The sample size was delimited to 60.
- The study duration was delimited to one month.

CHAPTER-II

REVIEW OF LITERATURE

The review of literature is an essential aspect of the scientific research. It is a systematic identification, location, scrutiny and summary of written material. This chapter contains information about the problem under study. The investigator gained insight in selected problem from an extensive research review.

This chapter is designed to include the reviews of related literature and the conceptual framework adopted for the study.

PART I: REVIEW OF RELATED LITERATURE

According to Brunner and Suddarth, type 2 diabetes mellitus is a metabolic disorder characterized by the relative deficiency of insulin production and a decrease in insulin action. Onset is usually insidious. According to Indian Council of Medical Research report in 2007, *India* leads the world with largest number of diabetic patients and is being termed the *"Diabetes capital of the world"*.

This chapter is organized systematically and classified in the following manner,

- Literature related to general information and preventing complications regarding type 2 diabetes mellitus.
- Literature related to lifestyle modifications.
- Literature related to diet therapy.
- Literature related to exercises.
- Literature related to foot care.
- Literature related to oral drug therapy.

PART II: CONCEPTUAL FRAMEWORK

PART-I

REVIEW OF RELATED LITERATURE

Diabetes mellitus is a group of metabolic disease characterized by elevated levels of glucose in the blood resulting from defects in insulin secretion, insulin action or both. Type 2 diabetes mellitus, a metabolic disorder characterized by the relative deficiency of insulin production and a decreased insulin action and increased insulin resistance, formerly called non-insulin-dependent, adult-onset, or type II diabetes.

Nurses provide patient and family education to help patients and their families to maintain health and cope with acute and chronic health problems. More specific teaching goals include maintenance of health, prevention of disease, management of illness and appropriate selection and use of treatment options. Teaching can help people make informed decisions about health practices and treatment choices. In patients with acute health problems, teaching can prevent complications and promote recovery. For those patients with chronic illness, teaching can promote self care and independence.

Self management education in patients with type 2 diabetes mellitus patients is effective. Interventions involving active participation have been improving diabetes knowledge, self-monitoring of blood glucose level, self reported dietary habits and glycemic control. Interventions involving active patient participation are more effective than didactic interventions. The nurse needs to realize that patients need to be in control of their own health and encourage patients to assume this role.

Literature related to general information and preventing complications regarding type 2 diabetes mellitus

Trudi.A.D, et al., (2009) has done a meta-analysis study on group based training for self management strategies in people with type 2 diabetes mellitus. They used randomised controlled and controlled clinical trials for adults with type 2 diabetes mellitus. There were 1532 participants in this study. The study concluded that group based training for self management strategies in people with type 2 diabetes mellitus is effective by improving fasting blood glucose levels, glycosylated hemoglobin, diabetes knowledge and reducing systolic blood pressure levels, body weight and the requirement for diabetes medication.

Albine.M, **et al., (2008)** has conducted a qualitative study on self management of type 2 diabetes mellitus among the older adults with type 2 diabetes mellitus in Netherland. Data were collected by means of in-depth interviews. The data analysis was completed by applying the constant comparative analysis as recommended in grounded theory. The study revealed that support from diabetes specialist nurses and family caregivers are a necessity of self managing diabetes mellitus.

Marshall.K.T, et al., (2006) has done a prospective study on measures of body fat distribution provide information on the risk of type 2 diabetes in addition to measures of general obesity. The study was conducted with 624 men and 990 nonpregnant women with above 18 years of age without diabetes mellitus. The study revealed that Body Mass Index was an excellent predictor of type 2 diabetes mellitus risk in Indians and was not significantly improved by combining it with other measures of general adiposity or body fat distribution.

Christa.M, et al., (2006) has done a cohort study on body fat distribution and risk of type 2 diabetes mellitus in the general population between men and women. The study included 3055 men and 2957 women aged 35–74 years who were free of diabetes mellitus. They have done a mean follow-up for 9.2 years, in that 243 cases type 2 diabetes mellitus in men and 158 cases in women had type 2 diabetes. The analysis showed the highest risk was observed in men and women

with a high body mass index in combination with a high waist circumference and a high waist hip ratio. The study concluded that waist circumference should be measured in addition to Body Mass Index to assess the risk of type 2 diabetes mellitus in both sex.

Amy.R.W, et al., (2004) has done a prospective cohort study on relationship of physical activity vs Body Mass Index with type 2 diabetes mellitus in women. The study was conducted with 37,878 women free of cardiovascular disease, cancer, and diabetes mellitus for 6.9 years of mean follow-up. The study concluded that although Body Mass Index and physical inactivity are independent predictors of incident diabetes. The magnitude of the association with Body Mass Index was greater than with physical activity in combined analyses.

Susan.L.N, et al., (2001) has reviewed the effectiveness of self management training in type 2 diabetes. A total of 72 studies were reviewed, the study was done with randomized controlled trials. The study revealed that educational interventions involved patient collaboration may be more effective than didactic interventions in improving glycemic control, weight, and lipid profiles.

Susan.L.N, et al., (2000) has done a meta analysis study on self management education for adults with type 2 diabetes mellitus. Studies included which was based on randomized controlled trials. The analysis revealed that glycosylated hemoglobin decreased more with additional contact time between participant and the health educator.

Aldo.M, et al., (1995) has explained regarding education about diabetes mellitus. They stated that education of diabetic patients proposed as an essential therapeutic tool. Structured education should depend on prevention of acute complications, near-normoglycemia to prevent late complications and about foot care. Education demands a lot from health care providers' specific training, teaching skills, good communication, supportive attitude, readiness to listen and to negotiate.

Literature related to lifestyle modifications

Clare.L.G, et al., (2007) has reviewed a meta analysis study on pharmacological and lifestyle interventions to prevent or delay type 2 diabetes mellitus in people with impaired glucose tolerance. The study was conducted by randomized controlled trials with 8084 participants with impaired glucose tolerance. The study concluded that lifestyle and pharmacological interventions reduce the rate of progression to type 2 diabetes mellitus in people with impaired glucose tolerance.

Matthew.J.G, et al., (2006) has done a study on lifestyle intervention in obese patients with type 2 diabetes mellitus and impact of the patient's educational background. The study consisted of a 12-month randomized controlled trial of 147 health plan members with type 2 diabetes mellitus who were overweight or obese with Body Mass Index more than 27 kg/m^2. The study revealed that people with varied educational backgrounds may respond differently to a lifestyle intervention for weight management and diabetes control.

Venkat N.K.M., et al., (2004) has done a study on primary prevention of type 2 diabetes mellitus by lifestyle intervention. The randomized, controlled trial was conducted over 3 to 4 years in 3 countries has that maintenance of weight loss through diet and physical activity reduces the incidence of type 2 diabetes mellitus in high risk persons by about 40% to 60%. This study showed scientific evidence supporting lifestyle intervention is needed to prevent or delay the occurrence of type 2 diabetes mellitus in high risk groups.

Ali.H.M, et al.,(2003) has done a survey on prevalence of obesity, diabetes mellitus, and obesity-related health risk factors. They included 1,95,005 adults aged 18 years and older. They found that in 2001 the prevalence of obesity with Body Mass Index more than 30 was 20.9% than 19.8% in 2000. Overweight and obesity were significantly associated with diabetes mellitus, high blood pressure, high cholesterol, asthma, arthritis, and poor health status. The study concluded that increase in obesity and diabetes mellitus among United States

adults continue in both sexes, all ages, all races, all educational levels, and all smoking levels.

Frank.B.H, et al., (2003) has done a prospective cohort study on television watching and other sedentary behaviors in relation to risk of obesity and type 2 diabetes mellitus in women. The study included 50,277 women who had a Body Mass Index of less than 30 and were free from cardiovascular disease, diabetes mellitus, or cancer. They have done a follow-up for 6 years which revealed 1,515 new cases of type 2 diabetes mellitus and they become obese with Body Mass Index more than 30. Each 1 hour per day of brisk walking has shown 24% reduction in obesity and a 34% reduction in diabetes mellitus. The study emphasized the importance of reducing prolonged television watching and other sedentary behaviors for preventing obesity and diabetes.

Jaakko.T, et al., (2001) has done a study on prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. They randomly assigned 522 middle-aged, overweight patients with impaired glucose tolerance. Each patient in the intervention group received individualized counseling aimed at reducing weight. The study was conducted over 3.2 years. The study revealed that the risk of diabetes mellitus was reduced by 58% in the intervention group. They concluded that type 2 diabetes mellitus can be prevented by changes in the lifestyles of high-risk patients.

Kazue.Y & Toshiro.T, (2000) has done a study on efficacy of lifestyle education to prevent type 2 diabetes mellitus. This meta-analysis study of randomized controlled trial more than 6 months was conducted with the experimental group and control group. The study concluded that lifestyle education was effective for reducing both plasma glucose and relative risk in high-risk individuals and may be a useful tool in preventing diabetes.

Lydia.A.B, et al., (2000) has reviewed the study on prevention of type 2 diabetes mellitus by diet and lifestyle modification, with the emphasis on epidemiologic data. They outlined a systematic approach to primary and secondary prevention of this disease. They concluded that, effective interventions

must target not only the affected individuals but also families, workplaces, schools and communities.

Literature related to diet therapy

Anthony.A, et al., (2008) has done a study on dietary carbohydrate restriction in type 2 diabetes mellitus and metabolic syndrome. Current nutritional approaches to metabolic syndrome and type 2 diabetes generally rely on reductions in dietary fat. The study showed that carbohydrate restricted diets are least effective for weight loss and that substitution of fat for carbohydrate is generally beneficial for risk of cardiovascular disease. The study concluded that carbohydrate restriction improves all of the features of metabolic syndrome.

Maria.P & Helen.D, (2006) has reviewed that the role of exercise and nutrition in type 2 diabetes mellitus management. Usually, low-intensity and long-duration exercise programmes are considered the most suitable for diabetes mellitus patients. The study concluded that encouragement to adopt healthy dietary choices with increase of physical activity and reduce of sedentary behaviors is a successful public health approach for type 2 diabetes mellitus prevention and management.

Steyn.N.P, et al., (2004) has done cohort a study on diet, nutrition and the prevention of type 2 diabetes mellitus. The patients used for this study was from low, middle and high income countries on dietary prevention of type 2 diabetes mellitus. The study revealed that the normal weight status in the lower Body Mass Index of 21–23 and regular physical activity is maintained throughout adulthood, abdominal obesity is prevented and saturated fat intake is less than 7% of the total energy intake.

Noemi.B.A, et al., (2004) has conducted a study on dietary behavior and type 2 diabetes mellitus care. They included 48 urban diabetes mellitus patients and 38 relatives over five meetings for an 8 month period. Risk assessment and impact evaluation included measurements on anthropometrics, diet, physical activity, nutrition knowledge, and glycosylated hemoglobin. The study revealed

that the intervention for nutritional knowledge and diet–health awareness increased and also showed that lack of support from family and health services, low income, neighborhood insecurity and lack of information are key barriers to behavioral change.

Emilio.R, (2003) has done a study on dietary monounsaturated fatty acids and metabolic control in type 2 diabetes mellitus. Whether low fat, high carbohydrate diets or moderately high fat, high monounsaturated fatty acid diets are preferable for the treatment and prevention of diabetes mellitus. The study revealed that energy-controlled high-monounsaturated fatty acid diets do not promote weight gain and are more acceptable than low fat diets for weight loss in obese patients.

David.J.A.J, et al (2003) has done a cohort study on type 2 diabetes mellitus and the vegetarian diet. This study revealed that the use of whole grain or traditionally processed cereals and legumes has been associated with improved glycemic control in both diabetes mellitus patients and insulin resistant patients. Long-term cohort studies have indicated that vegetarian diets will produce very significant metabolic advantages for the prevention and treatment of diabetes mellitus and its complications.

Literature related to foot care

Barth.R, et al., (2010) conducted a descriptive study on intensive education improves knowledge, compliance and foot problems in type 2 diabetes mellitus. The study was conducted with the experimental group and control group. The experimental group showed significantly greater improvements than the control group in foot care knowledge. At the first follow-up visit the experimental group also showed a significantly greater reduction in the number of foot problems requiring treatment than the control group.

Lone.G, et al., (2008) has conducted a qualitative study on patients' perspectives on foot complications in type 2 diabetes mellitus. The design of the study used was qualitative study using one-to-one interviews and the setting is a

suburban primary care health centre with the method of semi-structured interviews with a purposive sample of adults with type 2 diabetes mellitus. The study result shows that uptake of advice regarding preventive foot care was hampered because participants found it difficult to communicate with health professionals. So the health professionals need to explore and address the beliefs underlying patients' foot self care practices.

Tessier.D.M., et al., (2007) has stated that diabetes mellitus in the elderly persons is a chronic disease where self management is a key aspect, which includes lifestyle modification of diet and exercise, medication compliance and hypoglycaemia management. Education through a multidisciplinary approach may improve the glycaemic control in selected elderly patients with diabetes mellitus.

Mohammad.E.K, et al (2007) has done a cross-sectional study on knowledge and practice of foot care in Iranian people with 148 patients having type 2 diabetes mellitus in Tehran and Iran. The results of this study revealed that 56% patients were not aware of the effect of smoking on the circulation to the feet, 60% patients failed to inspect their feet and 42% patients did not know to trim their toenails, 66·5% patients used irritants to water and 62% patients were walking in barefoot.

Giorgia.D.B, et al., (2004) has conducted a study on type 2 diabetes mellitus patients offered adequate foot care and the role of physician and patient characteristics. The study was done with 3,564 participants. The study revealed that more than 50% of the patients reported that they did not have their feet examined by their physician and 28% referred that they had not received foot education.

Southern Medical Journal (2002) has stated that a foot with a constellation of pathologic changes affecting the lower extremity in diabetes mellitus patients often leading to amputation and death due to complications. The common initial lesion leading to amputation is a nonhealing skin ulcer induced by disease in the form of ulceration. This results in tremendous morbidity, mortality, and health care cost. Impaired glucose control over a period of years

affects peripheral nerve function by loss of protective sensation, muscle atrophy, foot deformity, and neuropathic fractures. They concluded that daily foot examinations and foot care can identify risk factors.

Literature related to Exercise

Clare.L.G, et al., (2006) has done a study on pharmacological and lifestyle interventions to prevent or delay type 2 diabetes mellitus in people with impaired glucose tolerance. The study was conducted with 8,084 participants with impaired glucose tolerance. The study revealed that lifestyle and pharmacological interventions reduce the rate of progression to type 2 diabetes mellitus in people with impaired glucose tolerance. Lifestyle interventions seem to be at least as effective as drug treatment.

Gang.H, et al., (2004) done a prospective study on physical activity, body mass index, and risk of type 2 diabetes mellitus in patients with normal or impaired glucose regulation. They conducted the study with 2,017 Finnish men and 2,352 Finnish women aged between 45 and 64 years without a history of known or newly diagnosed diabetes mellitus at baseline. During a mean follow-up of 9.4 years, there were 120 incident cases of type 2 diabetes mellitus patients. The study revealed that increasing physical activity can reduce the risk of type 2 diabetes mellitus.

Jonathan.M, et al., (2003) has conducted a study on active lifestyle and diabetes mellitus. The evidence demonstrating that physical inactivity plays a role in the development of several chronic diseases continues to grow. Expert panels convened by organizations such as the Centers for Disease Control and Prevention, the American College of Sports Medicine, and the American Heart Association, along with the United States Surgeon General's report on physical activity and health, have reinforced the association between regular physical activity and health. The study revealed that physical activity reduces cardiovascular mortality in those with existing diabetes.

Normand.G.B, et al., (2001) has done a database search on effects of exercise on glycemic control and body mass in type 2 diabetes mellitus. They selected studies that evaluated the effects of exercise interventions for the duration of more than 8 weeks in adults with type 2 diabetes mellitus. The study revealed that exercise training reduces glycosylated hemoglobin by an amount that should decrease the risk of diabetes mellitus complications.

Kelley.D.E & Goodpaster.B.H, (2001) has reviewed the effects of exercise on glucose homeostasis in type 2 diabetes mellitus patients. Large-scale, prospective studies indicate that higher levels of physical activity are clearly associated with a lower incidence of type 2 diabetes mellitus. The study revealed that increasing levels of physical activity contribute to better diabetes mellitus prevention.

Rogers.M.A, et al., (2000) has done a study on improvement in glucose tolerance after 1 week of exercise in patients with mild non insulin dependant diabetes mellitus. The study was conducted over 1 week of intense exercise on glucose tolerance in 10 men with abnormal glucose tolerance. The study revealed that, plasma glucose concentration at 120 minutes averaged 227 +/- 23 mg/dl in an oral glucose tolerance test before and 170 +/- 18 mg/dl after the 7 days of exercise. The study concluded that regularly performed vigorous exercise can be effective in decreasing insulin resistance and improving glucose tolerance within 7 days.

Literature related to drug therapy

Wendy.D.S, et al., (2005) has conducted a study on causes of hyperglycemia and hypoglycemia in adult inpatients**.** Failure to adjust antidiabetic drugs in response to decreases in oral intake and unexpected deviation from normal hospital routine was the most common factors contributing to hypoglycemia. Hyperglycemia was most often associated with an unwillingness of providers to take responsibility for diabetes mellitus management and the use of insulin regimens. The study concluded that hyperglycemia and hypoglycemia in

medical and surgical inpatients were mostly related to inadequate prescribing, monitoring, and communication practices.

Larissa.A.S, et al., (1999) has done a study on effects of metformin in patients with poorly controlled insulin-treated type 2 diabetes mellitus. The study was conducted with 43 patients with poorly controlled type 2 diabetes mellitus who were receiving insulin therapy for 24 weeks. Average final glycosylated hemoglobin levels were 6.5% in the metformin group and 7.6% in the placebo group. Patients in the placebo group gained an average of 3.2 kg of body weight, patients in the metformin group gained an average of 0.5 kg of body weight. The study revealed that addition of metformin to insulin therapy resulted in glycosylated hemoglobin concentrations that were 10% lower than those achieved by insulin therapy alone.

Alice.Y.Y.C & George.I.F, (2000) has reviewed about oral antihyperglycemic therapy for type 2 diabetes mellitus that orally administered antihyperglycemic agents can be used either alone or in combination with other orally administered antihyperglycemic agents or insulin. They reviewed the mechanism of action, efficacy and side effects of the different classes of orally administered antihyperglycemic agents and discussed the current recommendations for their use.

PART-II

CONCEPTUAL FRAMEWORK

The conceptual framework for this study was derived from General System Model given by Von Ludwig Bertalanffy (1968). According to general system theory, a system is a set of components or units interacting with each other within a boundary and the rate of flow of input and output to and from the system. Systems can be open or closed, systems are open for the exchanges of matter, energy and information within environment from which the systems receive input and gives back output in the form of matter, energy and information.

The investigator applied the general system theory aimed to assess the effectiveness of structured teaching programme on self management of type 2 diabetes mellitus. This involves interaction between the investigator and patients undergoing treatment for type 2 diabetes mellitus.

General system theory is useful in breaking the whole process into sequential tasks to ensure goal realization. The four major aspects of the systems are input, throughput, output and feedback which were described as below.

The assessment of the level of knowledge regarding the various aspects of type 2 diabetes mellitus, etiology, clinical manifestations, diagnostic findings, treatment and prevention of complications of diabetes mellitus among patients with type 2 diabetes mellitus is done by using the interview schedule in the pre test and post test of this study.

Input is any type of information, energy and material that enters the systems from environment through its boundaries.

In this study, input is a structured teaching programme regarding various aspects like general information and preventing complications regarding type 2 diabetes mellitus, lifestyle modifications, diet therapy, exercises, foot care and oral drug therapy on self management of type 2 diabetes mellitus.

Throughput is any information, energy or material that leaves the system and enters the environment through the system boundaries. Feedback allows this system to monitor its internal functions so that it can either restrict or increase its input and its output.

In the throughput, a process of change in knowledge and understanding about the various aspects like general information and preventing complications regarding type 2 diabetes mellitus, lifestyle modifications, diet therapy, exercises, foot care and oral drug therapy on self management of type 2 diabetes mellitus.

Output is the improved level of knowledge either adequate, moderately adequate or inadequate level of knowledge after structured teaching programme among patients with type 2 diabetes mellitus on self management of type 2 diabetes mellitus.

In this study, output is measured by the interview schedule on the level of knowledge on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus.

The improved score gained by the patients with type 2 diabetes mellitus indicates moderately adequate and adequate knowledge regarding self management of type 2 diabetes mellitus.

If the knowledge is inadequate a feedback can be given to the patients with type 2 diabetes mellitus by administering a structured teaching programme regarding various aspects of self management of type 2 diabetes mellitus and a post test can be conducted.

CHAPTER – III

METHODOLOGY

This chapter deals with a brief description of the methodology adopted by the investigator. This chapter includes research design, setting of the study, population, sample, sample size, sampling technique, criteria for sample selection, description of the instrument, pilot study and data collection procedure.

RESEARCH DESIGN

The research design selected for this study was pre experimental one group pre test post test design.

SETTING OF THE STUDY

The study was conducted in ESI hospital at Ayanavaram, Chennai. This is a 600 bedded hospital. It has two floors and consists of all the specialties including medicine, surgery, orthopedic, diabetology, obstetrics and gynaecology. It has the services like out patient department, inpatient department, emergency and intensive care unit. Diabetes outpatient day is on Friday and approximately 150 patients come for regular treatment and reviews. Some patients got admitted in this hospital for the diabetes treatment. There were 1150 patients with diabetes got admitted in a year and approximately 100 patients with diabetes mellitus got admitted in ESI hospital for a month. The setting of the study was male and female medical and surgical wards and the out patient department.

POPULATION

The target population of the study was all the patients who are diagnosed with type 2 diabetes mellitus in ESI hospital at Ayanavaram, Chennai.

SAMPLE

The sample consists of patients with type 2 diabetes mellitus with the age group of 40 years and above who fulfills the inclusive criteria.

SAMPLE SIZE

The sample size consists of 60 patients with type 2 diabetes mellitus in ESI hospital at Ayanavaram, Chennai.

SAMPLING TECHNIQUE

Convenient sampling technique was used for the study to select the samples among the target population.

CRITERIA FOR SAMPLE SELECTION

Inclusive criteria

- Patients who are with the age group of 40 years and above.
- Both male and female patients who have diagnosed with type 2 diabetes mellitus.
- Patients who know Tamil or English.
- Patients who are attending the diabetic out patient department and inpatient department in ESI hospital at Ayanavaram, Chennai.
- Patients who are willing to participate in the study.

Exclusive Criteria

- Patients who are diagnosed with type 1 diabetes mellitus, gestational diabetes mellitus.
- Patients with other systemic illness such as hypertension, cardiac disorders etc.
- Patients who are deaf and dumb.

DESCRIPTION OF THE INSTRUMENT

The tools for data collection consist of three parts.

Part-I

Demographic profile which consists of personal demographic variables like age, sex, education, occupation, religion, marital status, type of family, monthly income and clinical demographic variables like family history of diabetes mellitus, duration of diabetes mellitus, drug compliance, habit of doing exercise, food habits, history of hospitalization due to diabetes mellitus and exposure to insulin injection.

Part-II

The interview schedule was used to assess the level of knowledge. The tool was developed by the investigator on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus. It consists of,

1. General information and preventing complications
2. Lifestyle modifications
3. Diet therapy
4. Exercise
5. Foot care
6. Oral drug therapy

Scoring interpretation

- Adequate knowledge - 76%-100%
- Moderately adequate knowledge - 51%-75%
- Inadequate knowledge - $\leq$ 50%

The tool consists of 35 items regarding self management of type 2 diabetes mellitus. Each component has 5-10 questions. Each question has four options, in

that only one option is the correct answer and the remaining three options were wrong. For each correct response a score of ‘1’ and for wrong response ‘0’ score is given. The total score is 35.

Part-III

Structured teaching programme module on self management of type 2 diabetes mellitus consists of general information about type 2 diabetes mellitus such as meaning, causes, signs and symptoms, diagnostic findings, treatment, complications and prevention. Various audio-visual aids like handouts, pamphlets, booklet and charts were used for this structured teaching programme.

VALIDITY

The content validity of the instrument was obtained from the experts in the field of diabetology.

RELIABILITY

Reliability was measured by test retest method. The calculated ‘r’ value is 0.84 which represents positive correlation. So the tool was reliable to conduct this study.

ETHICAL CONSIDERATION

The study was conducted after the approval of dissertation committee and the medical officer. Formal permission was obtained from the medical officer of ESI hospital at Ayanavaram, Chennai.

Patients with type 2 diabetes mellitus were clearly explained about the study purpose and procedures. The formal written consent was taken from the samples. The usual assurance of anonymity and confidentiality was obtained.

PILOT STUDY

The prepared tools were used for pilot study to test the feasibility, appropriateness and practicability. The pilot study was conducted in ESI hospital at Ayanavaram, Chennai. The pilot study period was scheduled from 26-04-2010 to 30-04-2010. A formal permission was obtained from the higher authorities. The investigator has selected 6 patients who fulfilled the inclusive criteria using convenient sampling technique.

The investigator introduced herself to the patients and a brief introduction was given to explain the purpose of the study, so as to get their co-operation. Using the interview schedule the pre test level of knowledge on self management of type 2 diabetes mellitus was assessed. The tool was explained in detail to the patients, after 30 minutes the tool was collected. The structured teaching was given for 20 to 30 minutes on self management of type 2 diabetes mellitus. After three days, post test was conducted using the interview schedule to assess the effectiveness of the structured teaching programme.

On analysis of the data collected, it was found that structured teaching programme was effective in improving their knowledge on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus. The investigator got the patients adequately. The investigator found difficulty in obtaining the data from the illiterates, as they need repeated explanation. The pilot study also revealed that it was feasible and practicable to conduct the study at the selected setting. The tool which was used in pilot study was effective and it was used for the main study.

DATA COLLECTION PROCEDURE

The investigator used the interview schedule to assess the level of knowledge on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus. A formal permission was obtained from the higher authorities in ESI hospital at Ayanavaram, Chennai for the data collection. The data collection procedure was scheduled from 01-05-2010 to 30-05-2010. The

study was carried out with 60 patients who fulfilled the inclusive criteria using convenient sampling technique. The investigator introduced herself to the patients and purpose of the study was explained to ensure better co-operation during data collection and collected the data from the patients on one to one basis. The patients were interviewed by the investigator in male and female medical and surgical wards and also in the diabetic outpatient department. The investigator obtained oral consent from each patient. Every day 3-5 patients were assessed, on the first day; the tool was explained in detail and distributed to the patients to assess the pre test level of knowledge on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus.

The pre test was conducted for 30 minutes, after that the structured teaching pragramme was conducted by using various audio-visual aids for 20 to 30 minutes. The structured teaching programme was conducted as a group which includes 3-5 patients. After one week, the post test was conducted by using the same interview schedule.

DATA ANALYSIS

The data obtained were analysed using both descriptive and inferential statistics. Frequency and percentage distribution was used to determine the demographic variables. Mean and standard deviation was used to determine the knowledge on self management of type 2 diabetes mellitus. Chi-square test was used to analyze the association of demographic variables with level of knowledge on self management of type 2 diabetes mellitus. Paired ‘ t ‘ test was used to assess the effectiveness of structured teaching programme on self management of type 2 diabetes mellitus.

CHAPTER-IV

DATA ANALYSIS AND INTERPRETATION

This chapter deals with the analysis and interpretation of the data collected to assess the effectiveness of the structured teaching programme on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus.

Data were collected from 60 patients with type 2 diabetes mellitus in ESI hospital at Ayanavaram, Chennai by using the interview schedule. Descriptive and inferential statistics were used for data analysis. As per the objectives of the study the interpretation has been tabulated and organized as follows,

Section A: Frequency and percentage distribution of demographic variables of patients with type 2 diabetes mellitus.

Section B: Assessment of pre test level of knowledge on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus.

Section C: Assessment of post test level of knowledge on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus.

Section D: Comparison of pre test and post test level of knowledge on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus.

Section E: Comparison of mean and standard deviation between pre test and post test level of knowledge among patients with type 2 diabetes mellitus.

Section F: Association between pre test level of knowledge among patients with type 2 diabetes mellitus with their selected demographic variables.

Section G: Association between post test level of knowledge among patients with type 2 diabetes mellitus with their selected demographic variables.

SECTION-A

Table 1: Frequency and percentage distribution of personal demographic variables of patients with type 2 diabetes mellitus.

N=60

S.No.	Personal demographic variables	Frequency	Percentage
1	**Age in years**		
	41-50	28	46.7
	51-60	22	36.7
	61-70	10	16.7
	71 and above	0	0
2	**Sex**		
	Male	38	63.3
	Female	22	36.7
3	**Education**		
	Illiterate	20	33.3
	School	20	33.3
	Undergraduate	18	30
	Postgraduate	2	3.3
4	**Occupation**		
	Unemployment	18	30
	Business	6	10
	Labour	10	16.7
	Professional job	20	33.3
	Retired	6	10
5	**Religion**		
	Hindu	42	70
	Christian	16	26.7
	Muslim	2	3.3
	Others	0	0
6	**Marital status**		
	Single	6	10
	Married	44	73.3
	Widower	10	16.7
	Divorced	0	0
7	**Type of family**		
	Joint family	26	43.3
	Nuclear family	34	56.7
8	**Monthly income**		
	Below Rs.5,000	20	33.3
	Rs. 5,001-10,000	38	63.3
	Rs.10,001 and above	2	3.3

Table 1 shows, the frequency and percentage distribution of personal demographic variables of patients with type 2 diabetes mellitus. With respect to the age of patients with type 2 diabetes mellitus, 28(46.7%) patients were in the age group of 41-50 years, 22(36.7%) patients were in the age group of 51-60 years, 10(16.7%) patients were in the age group of 61-70 years and there were no patients in the age group of 71 and above.

With respect to sex of patients with type 2 diabetes mellitus, 38(63.3%) patients were males and 22(36.7%) patients were females. With regard to education of patients with type 2 diabetes mellitus, 20(33.3%) patients were illiterates, 20(33.3%) patients had school education, 18(30%) patients were undergraduates and 2(3.3%) patients were postgraduates.

In regard to occupation of patients with type 2 diabetes mellitus, 18(30%) patients were unemployed, 6(10%) patients were doing business, 10(16.7%) patients were labours, 20(33.3%) patients were having professional jobs and 6(10%) patients were retired. Related to religion of patients with type 2 diabetes mellitus, 42(70%) patients were Hindu, 16(26.7%) patients were Christians and 2(3.3%) patients were Muslims.

Considering marital status of patients with type 2 diabetes mellitus, 6(10%) patients were single, 44(73.3%) patients were married and 10(16.7%) patients were widower. Regarding type of family in patients with type 2 diabetes mellitus, 26(43.3%) patients were living in joint family and 34(56.7%) patients were living in nuclear family.

In accordance with monthly income of patients with type 2 diabetes mellitus, 20(33.3%) patients were getting below Rs.5,000, 38(63.3%) patients were getting Rs. 5,001-10,000 and 2(3.3%) patients were getting Rs. 10,001 and above.

Table 2: Frequency and percentage distribution of clinical demographic variables of patients with type 2 diabetes mellitus.

N=60

S.No.	Clinical demographic variables	Frequency	Percentage
1	**Family history of type 2 diabetes mellitus**		
	Yes	32	53.3
	No	28	46.7
2	**Duration of type 2 diabetes mellitus**		
	Less than 1 year	28	46.7
	1 year and above	32	53.3
3	**Drug compliance**		
	Regular	36	60
	Irregular	24	40
4	**Habit of doing exercise**		
	Yes	30	50
	No	30	50
5	**Food habits**		
	Vegetarian	16	26.7
	Non vegetarian	44	73.3
6	**History of hospitalization due to type 2 diabetes mellitus**		
	Yes	32	53.3
	No	28	46.7
7	**Exposure to insulin injection**		
	Yes	24	40
	No	36	60

Table 2 shows, the frequency and percentage distribution of clinical demographic variables of patients with type 2 diabetes mellitus. In regard to family history of type 2 diabetes mellitus, 32(53.3%) patients were having the

family history of type 2 diabetes mellitus and 28(46.7%) patients have no history of type 2 diabetes mellitus.

With regard to duration of type 2 diabetes mellitus of patients with type 2 diabetes mellitus, 28(46.7%) patients had the history of type 2 diabetes mellitus for less than1year and 32(53.3%) patients had the history of type 2 diabetes mellitus for 1year and above. In accordance with drug compliance of patients with type 2 diabetes mellitus, 36(60%) patients were taking medicines regularly and 24(40%) patients were taking medicines irregularly.

Related to habit of doing exercise of patients with type 2 diabetes mellitus, 30(50%) patients were doing regular exercise and 30(50%) patients were doing exercise irregularly. Considering food habit of patients with type 2 diabetes mellitus, 16(26.7%) patients were having vegetarian food and 44(73.3%) patients were having non-vegetarian food.

In accordance to hospitalization of patients with type 2 diabetes mellitus, 32(53.3%) patients had the history of hospitalization due to type 2 diabetes mellitus and 28(46.7%) patients had no history of hospitalization due to type 2 diabetes mellitus. Regarding insulin exposure to patients with type 2 diabetes mellitus, 24(40%) patients had insulin exposure and 36(60%) patients had no insulin exposure.

SECTION-B

Table 3: Frequency and percentage distribution of pre test level of knowledge on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus.

N=60

Level of knowledge	Pre test	
	Frequency	Percentage
Inadequate	18	30
Moderately adequate	24	40
Adequate	18	30

Table 3 shows, the frequency and percentage distribution of pre test level of knowledge on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus. In pre test level of knowledge, 18(30%) patients had inadequate knowledge, 24(40%) patients had moderately adequate knowledge and 18(30%) patients had adequate knowledge.

SECTION-C

Table 4: Frequency and percentage distribution of post test level of knowledge on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus.

N=60

Level of knowledge	Post test	
	Frequency	**Percentage**
Inadequate	0	0
Moderately adequate	6	10
Adequate	54	90

Table 4 shows, the frequency and percentage distribution of post test level of knowledge on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus. In post test level of knowledge, no one had inadequate knowledge, 6(10%) patients had moderately adequate knowledge and 54(90%) patients had adequate knowledge.

SECTION-D

Table 5: Frequency and percentage distribution of pre test and post test level of knowledge on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus.

N=60

Level of knowledge	Pre test		Post test	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Inadequate	18	30	0	0
Moderately adequate	24	40	6	10
Adequate	18	30	54	90

Table 5 shows, the frequency and percentage distribution of pre test and post test level of knowledge on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus. In pre test 18(30%) patients had inadequate knowledge, 24(40%) patients had moderately adequate knowledge and 18(30%) patients had adequate knowledge. In post test, no one had inadequate knowledge, 6(10%) patients had moderately adequate knowledge, and 54(90%) patients had adequate knowledge. The pre test and post test value shows that the structured teaching programme was effective.

SECTION-E

Table 6: Comparison of mean and standard deviation between pre test and post test level of knowledge on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus.

N=60

Level of knowledge	Mean (M)	Standard deviation (SD)	Paired 't' test value
Pre test level	17.73	6.560	13.036***
Post test level	32.20	2.265	

***Statistically Significant at p<0.001.

Table 6 shows, the comparison of mean and standard deviation between pre test and post test level of knowledge on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus. It reveals that, the pre test mean score was 17.73 with the standard deviation of 6.560 and the post test mean score was 32.20 with the standard deviation of 2.265. The projected 't' value was 13.036 which showed highly significant at p<0.001 level. So there was a significant increase in the level of knowledge after the structured teaching programme on self management of type 2 diabetes mellitus.

SECTION-F

Table 7: Association between pre test level of knowledge among patients with type 2 diabetes mellitus with their personal demographic variables. N=60

S.No.	Personal demographic variables	Pre test level of knowledge						Chi square χ^2
		Adequate knowledge		Moderate knowledge		Inadequate knowledge		
		n	%	n	%	n	%	
1	**Age in years**							
	41-50	8	13.3	14	23.3	6	10	χ^2=10.09
	51-60	10	16.7	6	10	6	10	df=6
	61-70	0	0	4	6.7	6	10	NS
	71 and above	0	0	0	0	0	0	
2	**Sex**							χ^2=4.498
	Male	14	23.3	16	26.7	8	13.3	df=2
	Female	4	6.7	8	13.3	10	16.7	NS
3	**Education**							
	Illiterate	0	0	12	20	8	13.3	**χ^2=30.834**
	School	4	6.7	6	10	10	16.7	**df=6**
	Undergraduate	12	20	6	10	0	0	**S*** **
	Postgraduate	2	3.3	0	0	0	0	
4	**Occupation**							
	Unemployment	2	3.3	6	10	10	16.7	
	Business	0	0	4	6.7	2	3.3	**χ^2=21.870**
	Labour	4	6.7	4	6.7	2	3.3	**df=8**
	Professional job	12	20	6	10	2	3.3	**S****
	Retired	0	0	4	6.7	2	3.3	
5	**Religion**							
	Hindu	16	26.7	14	23.3	12	20	χ^2=6.746
	Christian	2	3.3	8	13.3	6	10	df=6
	Muslim	0	0	2	3.3	0	0	NS
	Others	0	0	0	0	0	0	
6	**Marital status**							
	Single	0	0	4	6.7	2	3.366	**χ^2=19.026**
	Married	18	30	18	30	8	13.3	**df=6**
	Widower	0	0	2	3.3	8	13.3	**S***
	Divorced	0	0	0	0	0	0	
7	**Type of family**							**χ^2=7.286**
	Joint family	12	20	10	16.7	4	6.7	**df=2**
	Nuclear family	6	10	14	23.3	14	23.3	**S***
8	**Monthly income**							
	Below Rs.5,000	2	3.3	12	20	6	10	**χ^2=10.632**
	Rs.5,001-10,000	14	23.3	12	20	12	20	**df=4**
	Rs.10,001 and above	2	3.3	0	0	0	0	**S***

NS - Non Significant, S – Significant, *p<0.05,**p<0.01,***p<0.001.

Table 7 shows, the association between pre test level of knowledge among patients with type 2 diabetes mellitus with their personal demographic variables. The analysis revealed that the significance association could be established with their education at $p<0.001$ level with chi square value of 30.834, then with occupation at $p<0.01$ level with chi square value of 21.870, then with marital status at $p<0.05$ level with chi square value of 19.026, then with type of family at $p<0.05$ level with chi square value of 7.286, then with monthly income at $p<0.05$ level with chi square value of 10.632 and there was no association found with age, sex and religion.

Table 8: Association between pre test level of knowledge regarding self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus with their clinical demographic variables.

N=60

S.No.	Clinical demographic variables	Pre test level of knowledge						Chi square χ^2
		Adequate knowledge		Moderate knowledge		Inadequate knowledge		
		n	%	n	%	n	%	
1	**Family history of type 2 diabetes mellitus**							**χ^2=11.562**
	Yes	14	23.3	14	23.3	4	6.7	**df=2**
	No	4	6.7	10	16.7	14	23.3	**S****
2	**Duration of type 2 diabetes mellitus**							χ^2=0.178
	Less than 1 year	8	13.3	12	20	8	13.3	df=2
	1 year and above	10	16.7	12	20	10	16.7	NS
3	**Drug compliance**							**χ^2=17.408**
	Regular	16	26.7	16	26.7	4	6.7	**df=2**
	Irregular	2	3.3	8	13.3	14	23.3	**S*****
4	**Habit of doing exercise**							**χ^2=21.778**
	Yes	16	26.7	12	20	2	3.3	**df=2**
	No	2	3.3	12	20	16	26.7	**S*****
5	**Food habits**							**χ^2=11.136**
	Vegetarian	10	16.7	4	6.7	2	3.3	**df=2**
	Non-vegetarian	8	13.3	20	33.3	16	26.7	**S****
6	**History of hospitalization due to type 2 diabetes mellitus**							χ^2=0.178
	Yes	10	16.7	12	20	10	16.7	df=2
	No	8	13.3	12	20	8	13.3	NS
7	**Exposure to insulin injection**							χ^2=3.518
	Yes	4	6.7	12	20	8	13.3	df=2
	No	14	23.3	12	20	10	16.7	NS

NS - Non Significant, S – Significant,**p<0.01,***p<0.001.

Table 8 shows, the association between pre test level of knowledge among patients with type 2 diabetes mellitus with their personal demographic variables. The analysis revealed that the significance association could be established with their family history of type 2 diabetes mellitus at $p<0.01$ level with chi square value of 11.562, then with drug compliance at $p<0.001$ level with chi square value of 17.408, then with habit of doing exercise at $p<0.001$ level with chi square value of 21.778, then with food habits at $p<0.01$ level with chi square value of 11.136 and there was no association found with other demographic variables like duration of type 2 diabetes mellitus, history of hospitalization due to type 2 diabetes mellitus and exposure to insulin injection.

Table 9: Association between post test level of knowledge among patients with type 2 diabetes mellitus with their personal demographic variables.

N=60

S.No.	Personal demographic variables	Post test level of knowledge						Chi square χ^2
		Adequate knowledge		Moderate knowledge		Inadequate knowledge		
		n	%	n	%	n	%	
1	**Age in years**							
	41-50	26	43.3	2	3.3	0	0	χ^2=1.386
	51-60	20	33.3	2	3.3	0	0	df=6
	61-70	8	13.3	2	3.3	0	0	NS
	71 and above	0	0	0	0	0	0	
2	**Sex**							χ^2=2.584
	Male	36	60	2	3.3	0	0	df=2
	Female	18	30	4	6.7	0	0	NS
3	**Education**							
	Illiterate	16	26.7	4	6.7	0	0	χ^2=4.444
	School	18	30	2	3.3	0	0	df=6
	Undergraduate	18	30	0	0	0	0	NS
	Postgraduate	2	3.3	0	0	0	0	
4	**Occupation**							
	Unemployment	16	26.7	2	3.3	0	0	χ^2=10.618
	Business	4	6.7	2	3.3	0	0	df=8
	Labour	10	16.7	0	0	0	0	NS
	Professional job	20	33.3	0	0	0	0	
	Retired	4	6.7	2	3.3	0	0	
5	**Religion**							χ^2=5.502
	Hindu	40	66.7	2	3.3	0	0	df=2
	Christian	12	20	4	6.7	0	0	NS
6	**Marital status**							
	Single	12	10	0	0	0	0	χ^2=1.818
	Married	40	66.7	4	6.7	0	0	df=6
	Widower	8	13.3	2	3.3	0	0	NS
	Divorced	0	0	0	0	0	0	
7	**Type of family**							χ^2=0.272
	Joint family	24	40	2	3.3	0	0	df=2
	Nuclear family	30	50	4	6.7	0	0	NS
8	**Monthly income**							
	Less than Rs.5,000	20	33.3	0	0	0	0	χ^2=3.860
	Rs.5,001-10,000	32	53.3	6	10	0	0	df=4
	Rs10,001 and above	2	3.3	0	0	0	0	NS

NS - Non Significant, S – Significant.

Table 9 shows, the association between post test level of knowledge among patients with type 2 diabetes mellitus with their personal demographic variables. The analysis revealed that there was no significant association could be established with their personal demographic variables like age, sex, education, occupation, religion, marital status, type of family and monthly income.

Table 10: Association between post test level of knowledge among patients with type 2 diabetes mellitus with their clinical demographic variables.

N=60

S.No.	Clinical demographic variables	Post test level of knowledge						Chi square χ^2
		Adequate knowledge		Moderate knowledge		Inadequate knowledge		
		n	%	n	%	n	%	
1	**Family history of type 2 diabetes mellitus**							χ^2=1.072
	Yes	30	50	2	3.3	0	0	df=2
	No	24	40	4	6.7	0	0	NS
2	**Duration of type 2 diabetes mellitus**							χ^2=1.072 df=2
	Less than 1 year	24	40	4	6.7	0	0	NS
	1 year and above	30	50	2	3.3	0	0	
3	**Drug compliance**							χ^2=1.976
	Regular	34	56.7	2	3.3	0	0	df=2
	Irregular	20	33.3	4	6.7	0	0	NS
4	**Habit of doing exercise**							χ^2=0.740
	Yes	28	46.7	2	3.3	0	0	df=2
	No	26	43.3	4	6.7	0	0	NS
5	**Food habits**							χ^2=0.152
	Vegetarian	14	23.3	2	3.3	0	0	df=2
	Nonvegetarian	40	66.7	4	6.7	0	0	NS
6	**History of hospitalization due to type 2 diabetes mellitus**							χ^2=0.476
	Yes	28	46.7	4	6.7	0	0	df=2
	No	26	43.3	2	3.3	0	0	NS
7	**Exposure to insulin injection**							χ^2=1.976
	Yes	20	33.3	4	6.7	0	0	df=2
	No	34	56.7	2	3.3	0	0	NS

NS - Non Significant, S - Significant.

Table 10 shows, the association between post test level of knowledge among patients with type 2 diabetes mellitus with their clinical demographic variables**.** The analysis revealed that there was no association with any clinical demographic variables like family history of type 2 diabetes mellitus, duration of type 2 diabetes mellitus, drug compliance, habit of doing exercise, food habits, history of hospitalization due to type 2 diabetes mellitus and exposure to insulin injection.

CHAPTER-V

DISCUSSION

This chapter deals with the discussion of the results obtained from the statistical analysis. This study aimed to assess the effectiveness of the structured teaching programme on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus in ESI hospital at Ayanavaram, Chennai.

The hypothesis formulated was there is no significant relationship between the level of knowledge and structured teaching programme on knowledge regarding self management of type 2 diabetes mellitus. The review of literature included the related studies which provide a strong foundation for the study including the basis for conceptual framework and formation of tool.

The conceptual framework for this study was developed based on Von Ludwig Bertalanffy's theory (1968). The research design used in this study was pre experimental one group pre test post test design. It was carried out with 60 samples who fulfilled the inclusive criteria. Convenient sampling technique was used to select the samples among the target population.

The tool was distributed to the participants to assess the pre test level of knowledge. Structured teaching programme was given to the participants for the duration of 20 to 30 minutes. The post test was conducted after one week by using the same tool.

The data collected was analysed using descriptive and inferential statistics. The frequency and percentage distribution of personal demographic variables of patients with type 2 diabetes mellitus shows that, with regard to age the majority of the patients 28(46%) were in the age group of 41-50 years, with respect to sex of patients the majority of the patients 38(63.3%) were males, with regard to education the majority of the patients 20(33.3%) were illiterates and 20(33.3%) patients had school education.

In regard to employment the majority of the patients 20(33.3%) were having professional jobs, related to religion the majority of the patients 42(70%) were Hindu, considering marital status the majority of the patients 44(73.3%) were married. Regarding family type the majority of the patients 34(56.7%) were living in nuclear family and in accordance with monthly income the majority of the patients 38(63.3%) were getting Rs. 5,001-10,000.

Distribution of clinical variables of the study showed that, majority of the patients 32(53.3%) were having the family history of type 2 diabetes mellitus, with regard to duration of type 2 diabetes mellitus the majority of the patients, 32(53.3%) were having type 2 diabetes for 1 year and above.

Regarding drug compliance the majority of patients 36(60%) were taking the drugs regularly, regarding the habit of doing exercise 30(50%) patients were doing exercise regularly and 30(50%) patients were doing exercise irregularly. With regard to food habits the majority of patients 44(73.3%) were non-vegetarian.

Considering history of hospitalization due to type 2 diabetes mellitus, the majority of the patients 32(53.3%) were hospitalized and regarding exposure to insulin injection, the majority of the patients 36(60%) were not exposed to insulin injection.

The first objective was to assess the pre test level of knowledge on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus.

In pre test 24(40%) patients had moderately adequate knowledge, 18(30%) patients had adequate knowledge and 18(30%) patients had inadequate knowledge.

The second objective was to assess the post test level of knowledge on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus.

In post test 54(90%) patients had adequate knowledge, 6(10%) patients had moderately adequate knowledge and none of them had inadequate knowledge.

The study result correlated with David.G.B, et al., (2003) has done a study on diabetes education and knowledge in patients with type 2 diabetes from the community. There were 2264 type 2 diabetes mellitus patients participated in the study. The study concluded that diabetes related visits to dieticians and self monitoring of blood glucose were associated with diabetes education programs provided by the health care staff members.

The third objective was to assess the effectiveness of structured teaching programme on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus.

In comparison of pre test and post test level of knowledge, the pre test mean score was 17.73 with the standard deviation of 6.560 and the post test mean score was 32.20 with the standard deviation of 2.265. The projected 't' value was 13.036 which showed highly significant at $p<0.001$ level. The analysis revealed that there was a increase in post test level of knowledge from pre test, thus it indicates the effectiveness of structured teaching programme.

The study finding correlated with Trudi.A.D, (2006) et al., has done a meta-analysis study on group based training for self management strategies in people with type 2 diabetes mellitus. The study concluded that group-based training for self management strategies in people with type 2 diabetes mellitus is effective by improving fasting blood glucose levels, glycosylated hemoglobin, diabetes knowledge and reducing systolic blood pressure levels, body weight and the requirement for diabetes medication.

Hypothesis formulated for this study was that there was no significant association between structured teaching programme and the level of knowledge on self management of type 2 diabetes mellitus, but the post test reveals the mean value 32.20 was greater than the pre test value of 17.73, which indicates it was highly significant. So the null hypothesis was rejected and research hypothesis was accepted

that there was a significant association between structured teaching programme and the level of knowledge on self management of type 2 diabetes mellitus.

The fourth objective was to associate the pre test and post test level of knowledge on self management of type 2 diabetes mellitus with selected demographic variables among patients with type 2 diabetes mellitus.

In pre test level of knowledge the significant association was found in education, occupation, marital status, type of family and monthly income and no association with age, sex and religion in the personal demographic variables. In the clinical demographic variables family history of type 2 diabetes mellitus, drug compliance, habit of doing exercise and food habits and there was no association with duration of type 2 diabetes mellitus, history of hospitalization due to type 2 diabetes mellitus and exposure to insulin injection. In post test level of knowledge there was no significant relationship was found in personal or clinical demographic variables.

CHAPTER-VI

SUMMARY, CONCLUSION, NURSING IMPLICATIONS, RECOMMENDATIONS AND LIMITATION

The heart of the research project lies in reporting the findings of the study. This is the most creative and demanding part of the study. This chapter gives a brief account of the present study including the conclusion drawn from the findings, suggestions for the study, nursing implications, recommendations and limitation of the study. The present study was intended to know the level of knowledge among patients with type 2 diabetes mellitus.

SUMMARY

Left untreated, type 2 diabetes mellitus is a chronic, progressive condition, but there are well established treatments which can delay or prevent entirely the formerly inevitable consequences of the condition. Often, the condition is viewed as progressive since poor management of blood sugar leads to worsening complications. Managing their chronic illness and maintain quality of life depends primarily on what they are taught and learn about their conditions. Considering this, a study was conducted to find the effectiveness of structured teaching programme on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus.

The study was done to assess the effectiveness of structured teaching programme on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus in ESI hospital at Ayanavaram, Chennai.

The objectives of the study were,

1. To assess the pretest level of knowledge on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus.

2. To assess the post test level of knowledge on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus.

3. To assess the effectiveness of structured teaching programme on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus.

4. To associate the pre test and post test level of knowledge on self management of type 2 diabetes mellitus with selected demographic variables among patients with type 2 diabetes mellitus.

The hypothesis formulated was there is no significant association between structured teaching programme and the level of knowledge on self management of type 2 diabetes mellitus. The review of literature included the related studies which provide a strong foundation for the study including the basis for conceptual framework and formation of tool.

The conceptual framework for this study was derived from General System Model given by Von Ludwig Bertalanffy (1968). The research design selected for this study was pre experimental one group pre test post test design. The sample consists of 60 patients with type 2 diabetes mellitus in the age group of 40 years and above and who fulfills the inclusive criteria. Convenient sampling technique was used to select the samples among the target population. The instrument used for data collection was prepared by the investigator.

The data collection tool was validated and reliability was established. After the pilot study the data collection for the main study was done. The data was collected by interviewing the patients. Then the structured teaching programme was given for 20 to 30 minutes. The post test was conducted after one week by using the same tool to assess the effectiveness of structured teaching programme.

The data collected were analyzed using descriptive and inferential statistics. Frequency and percentage distribution was used to determine the demographic variables. Mean and standard deviation was used to determine the knowledge on self management of type 2 diabetes mellitus. Chi-square test was used to analyze the association of demographic variables with level of knowledge on self management of type 2 diabetes mellitus. Paired ‘ t ‘ test was used to assess

the effectiveness of structured teaching programme on self management of type 2 diabetes mellitus.

The major findings in the distribution of personal demographic variables of this study showed that, regarding 28(46.7%) patients were between the age group of 41-50 years, regarding sex 38(63.3%) patients were males, regarding education 20(33.3%) patients were illiterates and had school education, with regard to occupation 20(33.3%) patients were doing professional jobs, in accordance to religion 42(70%) patients were Hindus, regarding marital status 44(73.3%) patients were married, with regard to type of family 34(56.7%) patients were living in nuclear family, regarding monthly income 38(63.3%) patients were earning Rs.5,001-10,000.

The major findings in the distribution of clinical demographic variables of this study showed that, regarding family history of type 2 diabetes mellitus 32(53.3%) patients have the family history of type 2 diabetes mellitus, regarding duration of type 2 diabetes mellitus 32(53.3%) patients were having type 2 diabetes mellitus for more than1 year, with regard to drug compliance 36(60%) patients were taking medicines regularly, with regard to habit of doing exercise 30(50%) patients were regularly doing their exercise and 30(50%) patients were doing exercise irregularly, regarding food habits 44(73.3%) patients were non-vegetarian, with regard to exposure to insulin injection 36(60%) patients were not exposed to insulin injection.

The major findings of the studying in the data analysis revealed that there was significant relationship between pre test and post test level of knowledge on self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus. There was a marked increase in the mean value from 17.73 in pre test to 32.20 in post test and the standard deviation is decreased from 6.560 in pre test to 2.265 in post test which showed that, there was a highly significant difference between the pre test and post test level of knowledge regarding self management of type 2 diabetes mellitus among patients with type 2 diabetes mellitus. Hence it indicates the effectiveness of structured teaching programme.

CONCLUSION

The present study assessed the effectiveness of structured teaching programme. The study findings revealed that there was a significant improvement in the level of knowledge after providing structured teaching programme. Based on the findings it was evident that provision of such kind of structured teaching programme will motivate the patients with type 2 diabetes mellitus and help them to accquire knowledge on self management of type 2 diabetes mellitus. Therefore structured teaching programme was very important to provide quality nursing care which helps to meet the needs of the patients for their well being.

NURSING IMPLICATIONS

The findings of the study have implications in various areas of nursing service, nursing education, nursing administration and nursing research.

Nursing practice

The result of the study will help the nurse to enlighten their knowledge on the importance of health education regarding self management of type 2 diabetes mellitus. Health promotion is the vital function of the nurses and can use this structured teaching programme on three levels of prevention like primary, secondary and tertiary level for patients with type 2 diabetes mellitus.

The result of the study help the nurses to develop skills in providing efficient nursing care for effective management of type 2 diabetes mellitus. Nurses can utilize the techniques such as individual and group teaching to manage the complications of type 2 diabetes mellitus. In community, the community nurse can utilize this structured teaching programme for educating patients with type 2 diabetes mellitus in the community setup.

Nursing education

Students can utilize the structured teaching programme to give health education to patients with type 2 diabetes mellitus. The result can be used as a sample by the tutor in the classroom for giving importance to the health education

regarding self management of type 2 diabetes mellitus. Encourage the students for effective utilization of research based practice regarding self management of type 2 diabetes mellitus.

Both the teachers and students can involve themselves in giving health education on self management of type 2 diabetes mellitus to patients with type 2 diabetes mellitus and their relatives in the practical areas of nursing. Periodic seminars and group discussion can be arranged regarding type 2 diabetes mellitus.

Nursing administration

Nursing administrator can formulate policies that will include all nursing staff to be actually involved in the health education programme in their respective hospital and colleges regarding self management of type 2 diabetes mellitus. Nursing administrator can utilize the structured teaching programme while conducting in-service education programme for directing and motivating the staff towards the type 2 diabetes mellitus.

Nurse administrator have more responsibility as supervisor on creating awareness among patients with type 2 diabetes mellitus regarding prevention of complications by free distribution of booklets, handouts and charts regularly in the inpatient and out patient department of hospital, health clinics in urban and rural areas. A separate health education department can be organized which can play a major role in educating the patients with type 2 diabetes mellitus.

Nursing research

This study can be effectively utilized by the emerging researchers for their reference purpose regarding type 2 diabetes mellitus. A similar study can be replicated on type 2 diabetes mellitus by taking larger samples. The findings of the study can be disseminate in the conference, seminars and publishing in nursing journal.

RECOMMENDATIONS

- An information booklet can be prepared as a teaching aid in the hospital and health clinics.

- A longitudinal study can be done using post test after one month, 6 months, and after one year to see the retention of the knowledge.

- A similar study can be done in urban and rural areas, so findings can be compared.

- A similar study can be replicated on a large sample.

LIMITATION

Since there was no separate room, it was very difficult to conduct the study in out patient department.

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APPENDIX-D

PART-I

Demographic profile

Personal demographic variables

1. Age in years
    a. 41-50
    b. 51-60
    c. 61-70
    d. 71 and above

2. Sex
    a. Male
    b. Female

3. Education
    a. Illiterate
    b. School
    c. Undergraduate
    d. Postgraduate

4. Occupation
    a. Unemployment
    b. Business
    c. Labour
    d. Professional jobs
    e. Retired

5. Religion
    a. Hindu
    b. Christian
    c. Muslim
    d. Others

6. Marital status

a. Single

b. Married

c. Widower

d. Divorced

7. Type of family

a. Joint family

b. Nuclear family

8. Monthly income

a. Less than Rs. 5,000

b. Rs. 5,001-10,000

c. Rs.10,001 and above

Clinical demographic variables

1. Family history of type 2 diabetes mellitus

a. Yes

b. No

2. Duration of type 2 diabetes mellitus

a. Less than 1 year

b.1 year and above

3. Drug compliance

a. Regular

b. Irregular

4. Habit of doing exercise

a. Yes

b. No

5. Food habits

a. Vegetarian

B. Non-vegetarian

6. History of hospitalization due to type 2 diabetes mellitus

a. Yes

b. No

7. Exposure to insulin injection

a. Yes

b. No

PART-II

ASSESSMENT OF KNOWLEDGE ON SELF MANAGEMENT OF TYPE 2 DIABETES MELLITUS

General information and preventing complications regarding diabetes mellitus

1. What is diabetes mellitus?

a. Increase in lipid level

b. Increase in blood glucose level

c. Increase in billirubin level

d. Increase in blood pressure

2. Which organ produce insulin hormone?

a. Pancreas

b. Liver

c. Bone

d. Kidney

3. What is the cause of diabetes mellitus?

a. Hereditary

b. Fate

c. Vitamin deficiency

d. Fracture

4. What is the normal fasting blood glucose level?

a. 70-120 mg/dl

b. 130-180 mg/dl

c. 140-160 mg/dl

d. More than 200 mg/dl

5. Which age group most commonly affected by type 2 diabetes mellitus?

a. Below 20 years

b. Between 20-40 years

c. Below 40 years of age

d. Over 40 years of age

6. Which one of the following is not the sign of diabetes mellitus?

a. Frequent urination

b. Excessive hunger

c. Excessive thirst

d. Diarrhea

7. What is the common test done to diagnose the diabetes mellitus?

a. Blood glucose test (HbA1c)

b. Liver test

c. Kidney test

d. X –ray

8. Which one is not the symptom of low blood glucose level?

a. Weakness

b. Vomiting

c. Sweating

d. Giddiness

9. Which one of the following is not the goal for diabetes mellitus management?

a. To keep the blood glucose under normal level

b. To check the feet daily

c. To increase carbohydrate content foods

d. To reduce weight, if obese

10. What must be done during high blood glucose level (fasting blood glucose level – more than 110 mg/dl)?
    a. Avoid taking diabetes medications
    b. Continue diabetes medications as ordered
    c. Eat more sweets
    d. Sleep

Lifestyle modifications

11. Which one of the following is applicable for you?
    a. Smoking
    b. Alcohol consumption
    c. Eating more carbohydrate foods
    d. Maintain normal blood glucose level

12. Which methods is not followed to control diabetes mellitus?
    a. Diet
    b. Exercise
    c. Medications
    d. Fasting

13. When you are sick, which one of the following should not be followed?
    a. Checking your blood glucose level every 4 hours
    b. Avoid taking your diabetic medications
    c. Drink plenty of liquids
    d. Consult your doctor

14. What is the medical identification advised for you?
    a. Cotton clothes
    b. Hat
    c. Black dress
    d. Medical identification bracelet

15. If you are obese, what measures should not be done?
    a. Reduce body weight
    b. Reduce carbohydrate intake
    c. Increase physical activity
    d. Decrease physical activity

Diet therapy

16. What type of diet should be avoided?
    a. Wheat
    b. Roots and tubers like Potatoes and tapioca
    c. Green leafy vegetables
    d. Pulses

17. What should be consumed if there is low blood glucose level?
    a. Salt
    b. Spice
    c. Sugar
    d. Water

18. How frequent the diet to be taken by the diabetic patients?
    a. Small frequent meals
    b. 2 large meals
    c. 3 large meals
    d. Only fruit juices

19. How much amount of carbohydrate need to be taken if your blood glucose is less than 70 mg/dl?
    a. 15 grams
    b. 50 grams
    c. 75 grams
    d. 100 grams

20. Which one of the food item does not contain carbohydrate?

a. Rice
b. Potatoes
c. Bread
d. Vegetable

Exercise

21. Which one is not related to exercise therapy in diabetes?

a. To lower blood glucose level
b. To reduce weight
c. To decrease insulin resistance
d. To reduce hemoglobin level

22. What is the best time to do exercise in diabetic patients?

a. 1 hour before meals
b. According to doctor's orders
c. Early morning in a empty stomach
d. 1 hour after meals

23. What must be carried during exercise, for managing low blood glucose level?

a. Umbrella
b. Salted chips
c. Water
d. Sugar

24. When you should skip the exercise?

a. When you are tired
b. When you are busy
c. When you are out of station
d. When you have heavy meals

25. Which exercise is suitable for diabetic patients ?

a. Push ups
b. Swimming only
c. Weight lifting
d. Walking

Foot care

26. What is the purpose of the patient to wear shoes?

a. For fashion
b. To prevent injury to the foot
c. To relieve pain
d. To prevent falling

27. Which one of the following is not helpful to prevent foot ulcers?

a. Wash foot with warm water
b. Cut short the nails
c. Wearing shoes
d. Walk with bare foot

28. What will you do if an unhealed wound is formed?

a. Leave open
b. Consult physician
c. Take self medications
d. Apply oil

29. When do you use foot wear?

a. Always
b. Only when going out
c. When going to toilet
d. No need to wear at all

30. How frequently the diabetic patient must examine the foot?

a. Every day
b. Once in a week
c. Twice in a week
d. Once in a month

Oral drug therapy

31. How oral drugs helps in controlling high blood glucose level?

a. It stimulate the pancreas to secrete insulin
b. Delaying the absorption of glucose in the intestinal system
c. Enhance insulin action at receptor site
d. All the above

32. Which one of the following is not the oral antidiabetic drug?

a. Sulfonylureas
b. Biguanides
c. Anacin
d. Meglitinides

33. What is the correct time to take oral antidiabetic drugs?

a. As prescribed by the doctor
b. After 2 hours of meals
c. Only in the early morning
d. Only at night time

34. What will be the main side effect of oral antidiabetic drugs?

a. Hypoglycemia
b. Hyperglycemia
c. Diarrhea
d. Vomiting

35. When to skip oral diabetic drugs?

a. During high blood glucose level
b. During low blood glucose level
c. During high lipid level
d. During low blood pressure

KEYS FOR THE TOOL

1. b	19. a
2. a	20. d
3. a	21. d
4. a	22. b
5. d	23. d
6. d	24. a
7. a	25. d
8. b	26. b
9. c	27. d
10. b	28. b
11. b	29. a
12. d	30. a
13. b	31. d
14. d	32. c
15. d	33. a
16. b	34. a
17. c	35. b
18. a	

APPENDIX -E

STRUCTURED TEACHING PROGRAMME

ON

SELF MANAGEMENT OF TYPE 2 DIABETES MELLITUS

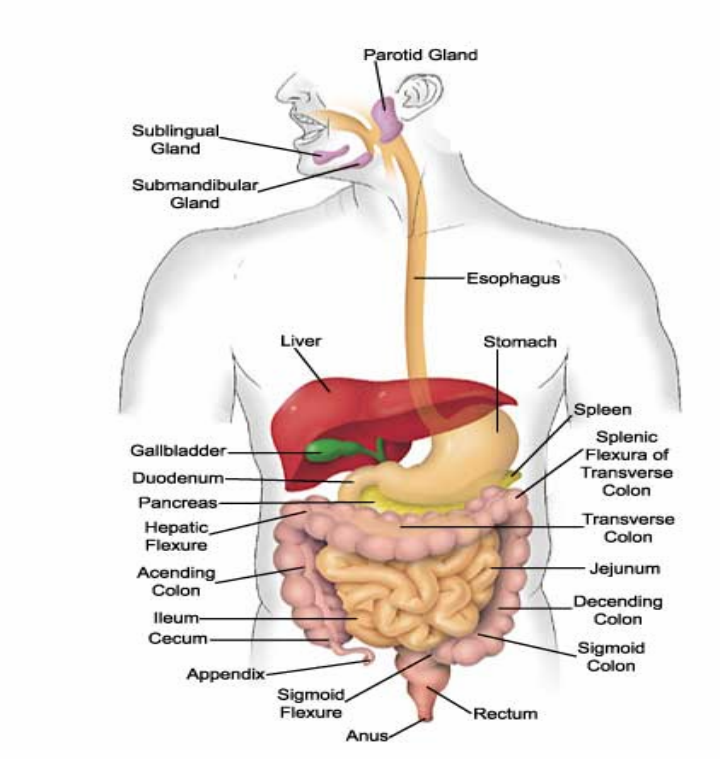
TYPE 2 DIABETES MELLITUS

DEFINITION

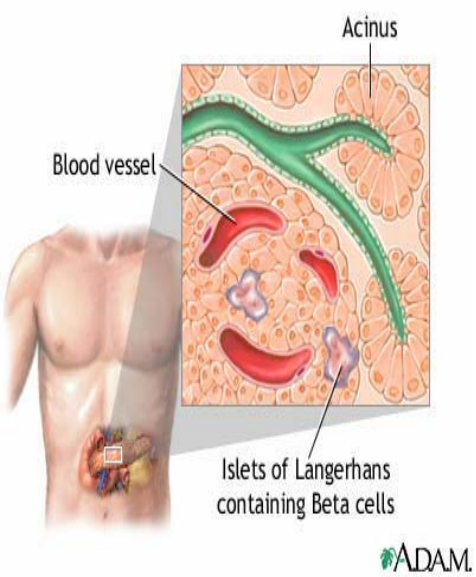
Diabetes mellitus is a multisystem disease related to abnormal insulin production, impaired insulin utilization, or both.

ANATOMY OF PANCREAS

Pancreas is a pale gray gland situated in the abdominal cavity just below the stomach. It is about 60 gram in weight and 12-15 cm in length. It has 3 parts: head, body and tail. This gland opens into the duodenum. The beta cells in the islets of langerhans of the pancreas secrete insulin.



Functions of insulin



1. Effect on carbohydrate metabolism
- Transport and uptake of glucose
- Peripheral utilization of glucose
- Storage of glucose
- Inhibition of glycogenolysis
- Inhibition of gluconeogenesis

2. Effect on protein metabolism
- Transport of amino acids into the cells from blood.
- Synthesis of protein is accelerated by influencing the transcription of DNA and by increasing the translation of m-RNA.
- Inhibition of protein catabolism
- Prevention of gluconeogenesis
- Decreasing the release of amino acids from the cells
- Inhibiting the enzymes which are involved in gluconeogenesis

3. Effect on fat metabolism
- Synthesis of fatty acids and triglycerides
- Transport of fatty acids into adipose tissue
- Storage of fat

4. Effect of insulin on growth

Along with growth hormone, insulin promotes growth of body.

RISK FACTORS

- Heredity
- Obesity
- Alcohol consumption
- High cholesterol
- Hypertension
- Acromegaly
- Cusing's syndrome

- Thyrotoxicosis
- Pheochromocytoma
- Chronic pancreatitis
- Cancer
- Drugs (Beta blockers, Calcium channel blockers, Corticosteroids, Thiazide diuretics, Fluoroquinolones, etc)

TYPES OF DIABETES MELLITUS

Type 1diabetes mellitus

In type 1 diabetes the cells that produce insulin are damaged or destroyed so the pancreas is no longer able to make any insulin. Persons with type 1 diabetes need to take injected insulin and learn to balance their insulin with their food choices.

Type 2 diabetes mellitus

In type 2 diabetes your body is either unable to make enough insulin or your insulin no longer works right. The glucose in your blood cannot get from the blood into the cells and becomes elevated.

Gestational diabetes mellitus

It is any degree of glucose intolerance with its onset during pregnancy. Hyperglycemia develops during pregnancy because of the secretion of placental hormones, which causes insulin resistance.

Secondary diabetes mellitus

Occurs because of another medical condition or due to treatment of a medical condition that causes abnormal blood glucose levels. Conditions causing secondary diabetes includes cushing syndrome, hyperthyroidism, use of parenteral nutrition, medications like corticosteroids, phenytoin, antipsychotics. This resolves when underlying condition is treated.

PATHOPHYSIOLOGY

Insulin resistance means that body cells do not respond appropriately when insulin is present. Unlike type 1 diabetes mellitus, insulin resistance is generally "post-receptor", meaning it is a problem with the cells that respond to insulin rather than a problem with the production of insulin.

SIGNS AND SYMPTOMS

- Fatigue
- Generalized weakness
- Malaise
- Excessive urine production
- Excessive thirst
- Excessive fluid intake
- Blurred vision
- Unexplained weight loss and Lethargy
- Itching of external genitalia
- Excessive bowel movements

DIAGNOSTIC STUDIES

1. History collection

2. Physical examination

    - Blood pressure

    - Body mass index

    - Fundoscopic examination

    - Foot examination

    - Skin examination

    - Neurological examination

- Oral examination

3. Blood tests

- Fasting blood glucose
- Postprandial blood glucose
- Glycosylated hemoglobin
- Lipid profile
- Blood urea nitrogen
- Serum creatinine
- Serum electrolytes

4. Urine for complete urinalysis

5. Electrocardiograph

MANAGEMENT

Components of diabetes mellitus management

- Nutritional management
- Exercise
- Monitoring
- Pharmacological therapy
- Education

NUTRITIONAL MANAGEMENT

The most important objective in the dietary and nutritional management of diabetes mellitus is control of total caloric intake to attain or maintain a reasonable body weight and control of blood glucose levels.

Carbohydrates are converted to glucose, they directly affect blood glucose levels. If your blood glucose is high 2 hours after meals, you might try less carbohydrate or a different type of carbohydrate. Because heart disease and high blood pressure are

common in persons with diabetes, it is good to follow nutrition suggestions such as low salt and low fat to help prevent these concerns.

Nutritional guidelines

1. Eating at the same time and same amount of food every day is important for some people, especially those who take diabetic drugs.

2. If a meal is skipped or delayed while on these regimens, you are at risk for developing low blood glucose.

3. Losing even a small amount of weight (5 to 10 percent of total body weight) can help the body to produce and use insulin more efficiently. In fact, eating fewer calories can reduce blood sugar levels even before the first pound is lost.

4. The number of calories needed to maintain weight depends upon your age, sex, height, weight, and activity level. In general:

   Men, active women - 15 calories/pound

   Most women, sedentary men, and adults over 55 years - 13 cal/lb

   Sedentary women, obese adults - 10 cal/lb

   Pregnant, lactating women - 15 to 17 cal/lb

5. A standard diabetic diet is low in carbohydrates, high in fibers and low in fats. Following a diabetic diet does not mean that one should completely avoid eating foods that contain carbohydrates.

6. Foods high in fiber help in lowering the increased blood sugar level, since they delay the sugar absorption in the body and decrease the need for exogenous insulin. Moreover, dietary fiber foods also help in lowering bad cholesterol in the body. Whole grains, fresh fruits and vegetables are some of the foods that are high in fiber.

7. Diabetic patients should strictly avoid eating foods high in fats. Such foods worsen the symptoms of diabetes and also increase risk of developing other health problems like heart diseases.

8. Along with a diet plan, follow an exercise routine. This will help you to maintain normal blood sugar level and also reduces risk of other health problems.

9. Avoid eating ready-made or processed food and rely on fresh fruits and vegetables.

10. Increase the consumption of fresh fruits and vegetables, since they are low in fats and provide all the required nutrients.

11. Foods high in carbohydrates like bread, potato and sugar, should be consumed in controlled quantity.

12. Minimize use of oils and sugar and make habit of following a sugar free regime.

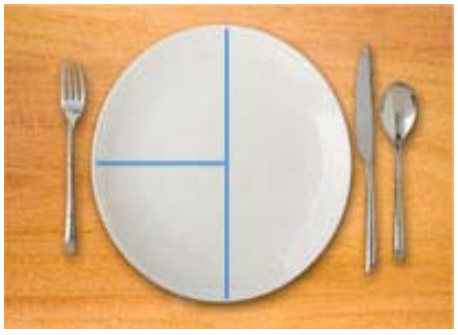
13. Mixers, such as fruit juice or regular cola, can increase blood sugar levels and increase the number of calories consumed in a day.

14. Avoid alcohol intake and smoking.

15. Avoid feasting and fasting.

American Diabetes Association has given a guideline for meal planning as,

1. Using a dinner plate, draw an imaginary line down the middle of your plate, then divide the left side of your plate once more into 2 equal sections. Now you have 3 sections on your plate—2 small and 1 large.



2. For every meal, try to fill the largest section with nonstarchy vegetables such as spinach, carrots, lettuce, greens, green beans, broccoli, cauliflower, tomatoes, or cucumbers.

3. In 1 of the small sections, place starchy foods such as whole-grain breads, rice, pasta, peas, potatoes, corn, lima beans, low-fat crackers or chips.

4. In the other small section, put your low-fat meat such as a small piece of chicken, lean beef, or pork; or go with high-protein meat substitutes such as eggs, or low-fat cheese.

5. Add a low-fat drink and a piece of fruit for dessert.

To avoid weight gain, the following tips are recommended.

a. Measure your weight on a regular basis (eg, once weekly). Weight gains of more than 2 to 3 pounds indicate a need to decrease the amount you eat or increase activity.

b. As blood glucose level improves, it may be necessary to decrease your calorie intake by 250 to 300 calories per day to avoid weight gain.

c. If blood glucose levels are frequently low at a particular time of day, decrease the medication dose rather than add a snack.


New Food Pyramid
Limit intake of red meat & butter
Limit high glycemic foods
Low fat dairy, and soy milk
1-2 servings
Multiple vitamins for most
Water, 5-8 glasses
Eggs, fish, poultry, and plant proteins
1-2 servings
Legumes
1-2 servings
Nuts and seeds
1-2 servings
Whole grains
4-8 servings
Plant oils
2-4 servings
Vegetables
3-5 servings
Fruits
2-4 servings
Daily exercise and weight control

SAMPLE DIET CHART

Total calories: 1500 kilo calories/day

Low protein and low fat diabetic diet.

Time	Menu	Quantity
Early morning (6.00-7.00 a.m.)	Tea/Coffee without sugar with skimmed milk	1 cup + 2 Marie gold biscuits
Breakfast (8.00-9.00 a.m.)	Idly or Dosai or Chappathi or Pongal or Uppuma or Brown bread with Tomato or Mint chutney or Sambar	4 nos. 3 nos. 3 nos. 2 cups. 2 cups 4 slices
Mid-morning (11.00-11.30 a.m.)	Skimmed butter milk or Vegetable soup or Lime juice with salt Marie biscuit or Vegetable salad	1 cup 1 cup 1 cup 2 nos. 1 cup
Lunch (1.00-1.30 p.m.)	Rice or Chappathi Sambar Rasam Buttermilk Greens Vegetable	2 cup 1 cup (150 gram)
Evening snack (3.30-4.00 p.m.)	Brown bread or Sundal or Aval uppuma Tea/Coffee without sugar With skimmed milk	2 slices 1 cup (150 ml)
Mid evening (5.30-6.30 p.m.)	Vegetable soup/Skimmed butter milk	1 cup
Dinner (8.30-9.00 p.m.)	Same as lunch	
Bed time	Skimmed milk without sugar/Skimmed butter milk	1 cup

Note: Weekly once Motton or Chicken or Fish or Egg without yolk can be taken.

Foods to be included

- Vegetables - Plantain stem, plantain flower, radish, cabbage, bitter gourd, ladies finger, beans, ridge gourd, white ashgourd, brinjal, bottle gourd, onion, drumstick, knoll-khol, cucumber, tomato, cauliflower, pumpkin, capscicum, turnip, cho chomarrow.
- Greens
- Any one fruit per day -1/2 apple, 1 sweet lime, 3 pieces papaya, 1 guava, 1 orange when sugar levels are under control.
- Plain soda water.
- Gingely oil, sunflower oil, groundnut oil (refined), olive oil.

Foods to be avoided

- Roots and tubers.
- Sugar, glucose, honey, jam, cake, chocolate, ice cream, concentrated milk preparations-kheer.
- Butter, ghee, vanaspathi, coconut oil.
- Nuts-ground nut, pista, cashewnuts, dried fruits-raisins.
- Aerated drinks, horlicks, boost, bournvita.
- Fatty mutton, beef, pork, liver, kidney, brain, heart.
- Fruits- banana, jack fruit, sapota, mango, grapes, custard apple.
- Alcohol, cigarette smoking.
- Tinned or canned foods.

EXERCISE

Exercise is extremely important in managing diabetes because of its effects on lowering blood glucose and reducing cardiovascular risk factors. Exercise lowers the blood glucose level by increasing the uptake of glucose by body muscles and by improving insulin utilization.

Any physical activity you do - housework, gardening, lawn mowing, chopping wood, shopping – will lower your blood glucose level**.**

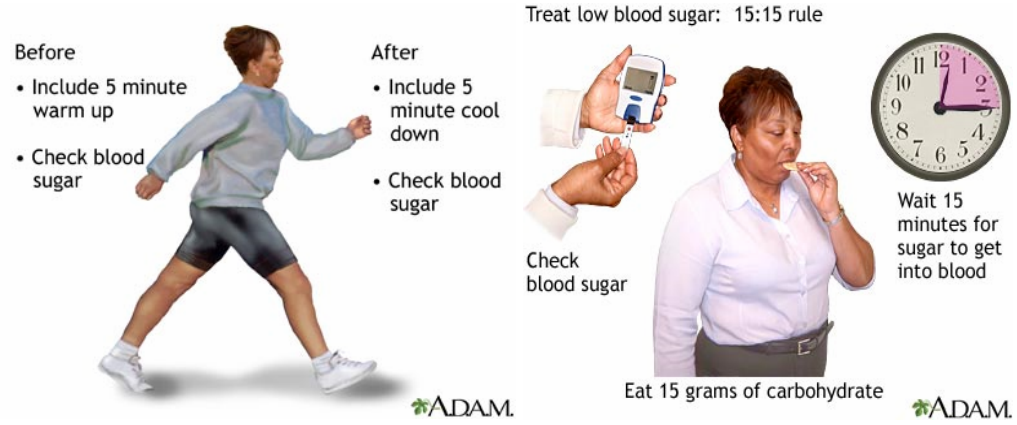
Exercise guidelines

1. Start out easy and gradually increase intensity and duration. Warm up and cool down for 5 - 10 minutes to prevent heart problems as well as make you less susceptible to injury.
2. Don't exercise outdoors on very hot or humid days. You can get heat exhaustion or heat stroke.
3. In warm weather, dress in lightweight, light-colored, loose-fitting cotton clothing or special fabrics that promote heat loss. Wear a hat and apply sunscreen.
4. To prevent dehydration, drink a cup of cold water before and after you exercise.

5. If you exercise longer than 30 minutes or are sweating a lot, drink water during your workout.
6. Know the warning signs of heart problems: chest, arm or jaw pain, nausea, dizziness or fainting (also signs of heat exhaustion or hypoglycemia), unusual shortness of breath during exercise, irregular pulse.
7. In patients with extensive eye disease related to diabetes (diabetic retinopathy), the intensity and type of exercise may need to be limited. Activities that should be avoided include excessive straining (as in weight lifting), excessively jarring activities (such as boxing), and exercise that involves severe pressure changes (like diving). If there is early eye disease and no new vessel formation, no limitations are necessary. If kidney disease is present, the only precaution is avoiding exercise that can raise blood pressure.
8. The three key aspects in any exercise program are :

FIT: i.e. Frequency, Intensity and Timing.

- Exercise should be done frequently i.e. at least 5 times a week.
- It should be intense. Exercise should be intense enough to burn sufficient calories.
- Timing: Minimum 45 minutes to one hour walking is important for getting maximum benefit.



The American Diabetes Association has published recommendations for exercise stress testing in diabetes patients who are having the following risks,

- Any patient with cardiac symptoms.
- Abnormal resting electrocardiograph.
- Peripheral or carotid artery disease.
- Sedentary lifestyle, age >(greater than) 35 years, and plans to begin a vigorous exercise program.
- Two or more of the following risk factors in addition to diabetes.
- Total cholesterol >240mg/dl, low density lipoprotein-160mg/dl, or high density lipoprotein <35mg/dl.
- Blood pressure >140/90 mmHg.
- Smoking.
- Family history of premature heart disease.
- Kidney involvement from diabetes.

The American Diabetes Association has made the following recommendations for Exercising,

- Carry an Identity card and wear a bracelet that identifies you are having diabetes mellitus.
- Be alert for signs of hypoglycemia during and after exercise.
- Drink plenty of fluids before, during, and after exercise.
- Measure blood sugar levels and act if the reading is less than 80mg/dl or greater than 240mg/dl.

IDENTIFICATION CARD FOR DIABETES MELLITUS

Name :
Patient ID :
Date of registration :

The benefits of exercise in patients with diabetes, and in those at high-risk for developing type 2 diabetes (and those with Syndrome X), may include the following,

1. Reduce heart disease.
2. Prevention of diabetes in those at high risk.
3. Improve muscle sensitivity to insulin.
4. Better blood sugar control by utilizing glucose effectively, which reduces the amount of insulin needed.
5. Better blood cholesterol profiles.
6. Better blood pressure control.
7. Potential weight loss.
8. Exercise relieves stress and tension and a well-exercised body feels good.

Managing hypoglycemia during exercise

The increased glucose uptake by the muscles produces low blood glucose levels which can continue for 12 - 24 hours. The warning signs for mild and moderate hypoglycemic reactions are: trembling or shakiness, rapid heart rate, palpitations, increased sweating, excessive hunger, headache, drowsiness, mental confusion, and abrupt mood changes. In the event of a hypoglycemic attack:

- Take action even if you are not sure you have hypoglycemia--waiting can make your symptoms much worse.
- Take a blood-glucose test to confirm the problem.
- Eat or drink foods with sugar such as 1/2 cup of fruit juice, six lifesavers, 1 small box of raisins, or 3 glucose tablets. Food with fat should be avoided because it blocks the absorption of sugar into the bloodstream.
- Take at least a 10 - 15 minutes rest and retest blood-glucose level before resuming exercise. Don't exercise if it's below 100 mg/dl or you still don't feel right.
- If you do continue to exercise, be on the lookout for any signs that the hypoglycemic reaction is not over. Take your blood-glucose level at least every 20 - 30 minutes during your workout. After your workout eat a complex carbohydrate snack (starchy food).
- Measure blood sugars before, during, and after exercise.

- For unplanned exercise, take 20 to 30g of carbohydrates extra for each 30 minutes of exercise.

- If you exercise in the evening, you may need to add a snack before bedtime to make certain your sugars don't go too low at night.

Exercise tips

- Exercises that use large muscles (such as the legs) and more muscles are most effective.
- Walking, biking, swimming, and fitness classes are excellent activity options.
- If you are taking insulin or other diabetes medication, have 15-30 grams of carbohydrate available to treat a low blood glucose if needed.

If you have any concerns about the safety of an exercise program, check with your physician first.

Exercise precautions

Exercising with elevated blood glucose level increases the secretion of glucagon, growth hormone and catecholomines. The liver then releases more glucose, and, the result is an increase in the blood glucose level. The patient who requires insulin should be taught to eat a 15 gram carbohydrate snack before engaging in moderate exercise, to prevent unexpected hypoglycemia.

To avoid post exercise hypoglycemia the patient may need to eat a snack at the end of the exercise session and at bed time and monitor the blood glucose level more frequently.

In obese people with type 2 diabetes, exercise in addition to dietary management both improves glucose metabolism and enhances lose of body fat.

Body Mass Index (BMI) chart

Healthy BMI is 23

Category	Category	Category
Underweight	<18.5	Low
Normal range	18.5 - 22.9	Average
Overweight (at risk)	23.0 – 24.9	Increased
Obese I	25 – 29.9	Moderate
Obese II	>30.0	Severe

PHARMACOLOGIC THERAPY

In type 2 diabetes mellitus, the pancreas cells continue producing insulin, but the cells develop a resistance to insulin and in these cases, oral medicines are effective. In type 2 diabetes mellitus, insulin may be necessary on long- term basis to control glucose levels if diet and oral agents fail, during illness, infection, pregnancy, surgery, or some other stressful event.

- Take your medicines at the same times each day.
- Talk with your doctor or diabetes teacher about the best times to take your diabetes medicines. Fill in the names of your diabetes medicines, when you should take them, and how much you should take.

CATEGORIES OF INSULIN

- Rapid acting insulin- Lispro - 3 hours
- Short acting insulin – Regular - 4-6 hours
- Intermediate acting insulin - NPH (Neutral Protamine Hagedorn)–16- 20 hours
- Long acting insulin - Ultralente – 20- 30 hours
- Very long acting insulin - Glargine – 24 hours

ALTERNATIVE METHODS OF INSULIN DELIVERY

- Insulin pens
- Jet injectors
- Insulin pumps
- Oral spray
- Skin patch
-

ORAL ANTI DIABETIC AGENTS

1. First generation sulfonylureas
   - Chlorpropamide
   - Tolazamide
2. Second generation sulfonylureas
   - Glipizide
   - Glimepiride
3. Biguanides
   - Metformin
4. Alpha glucosidase inhibitors
   - Acarbose
5. Thiazolidinediones
   - Pioglitazone
6. Meglitinides
   - Repaglinide

LIFESTYLE MANAGEMENT

Quitting smoking

Over 25 percent of people newly diagnosed with diabetes are smokers. Quitting smoking is one of the most important things a patient can do to improve their health.

Smokers with diabetes have an increased risk of the following,

- Death, especially from heart attacks and strokes.
- Higher level of Low density lipoprotein "bad" cholesterol levels.

- Worsened blood sugar controlled, compared to non-smokers.
- Nerve damage from diabetes.
- Kidney disease leading to dialysis.
- Foot ulcer and amputation of toes, feet or legs caused by peripheral vascular disease.

Performing blood sugar monitoring

The following steps include general guidelines for testing blood sugar levels; you should get specific details for your blood glucose monitors from the package insert or your healthcare provider.

1. Wash hands with soap and warm water. Dry hands.
2. Prepare the lancing device by inserting a fresh lancet. Lancets that are used more than once are not as sharp as a new lancet, and can cause more pain and injury to the skin.
3. Prepare the blood glucose meter and test strip.
4. Use the lancing device to obtain a small drop of blood from your fingertip .
5. Apply the blood drop to the test strip in the blood glucose meter. The results will be displayed on the meter after several seconds.
6. Dispose of the used lancet in a puncture-resistant sharps container (not in household trash).

7. Glycosylated hemoglobin is a relatively new blood test, which will give you the average blood sugar levels over the past 2-3 months. Glycosylated

hemoglobin (HbA1c) as close to 7% which is the value termed as good control. Good control will go a long way in preventing diabetic complications.

8. You should review your blood sugar results regularly with a healthcare provider. The record should include the time and date, blood glucose result, and dose of medication used; additional notes about what you ate, exercise, and difficulties with illness or stress can also be helpful but are not generally required every day.

Foot care

Diabetes can damage your nerves. This, in turn, may make you less able to feel an injury or pressure on the skin of your foot. You may not notice a foot injury until severe damage or infection develops. The affected limb may need to be amputated if these skin ulcers do not improve, get larger, or go deeper into the skin.

a. Foot examination

1. Check your feet daily for cuts, blisters, red spots, swelling, anything that may not be normal. Use a mirror to check the bottoms of your feet or ask a family member for help if you have trouble seeing them or use a mirror to look under the foot if you can not see it. Look carefully at the top, sides, soles, heels, and between the toes. (Just before bedtime is a good time to do this).

2. If obesity prevents you from being physically able to inspect your feet, ask a family member, neighbor, or visiting nurse to perform this important check.

3. Report sores or other changes to your doctor immediately. Report all blisters, bruises, cuts, sores, or areas of redness.

4. Get a foot exam by your health care provider at least twice a year and learn whether you have nerve damage.

b. Cleaning foot

1. Wash your feet every day in warm (not hot) water and dry your feet well, particularly between the toes.

2. Keep the skin of your feet soft and smooth by rubbing a thin coat of skin lotion daily over the tops and bottoms of your feet, but not between your toes, to prevent dry skin and cracking.

3. Keep your toenails trimmed straight across and file the edges with an emery board or nail file. Soak your feet in lukewarm water to soften your nails before trimming.

4. Do not try to remove corns and callus yourself - see a Podiatrist for this; NEVER use commercial corn cures - this is so important in those with diabetes as it is so easy to damage the skin.

5. Do not apply a heating pad or hot water bottle to your feet. Avoid hot pavement or hot sandy beaches.

c. Foot wear

1. Always use a MCR foot wear where ever you go. Avoid going barefoot, even in your own home (this lessens the chance of some accidental damage)

2. Wear comfortable shoes and socks. Walking barefoot can be a hazard to your feet.

3. Protect your feet from hot and cold by, for example, wearing shoes at the beach and on hot pavement and by wearing socks at night if your feet get cold.

4. Check the inside of your shoes for rough areas or torn pieces that can cause excess pressure or irritation.

5. Change or temporarily remove your shoes after 5 hours of wearing them during the day. This changes the pressure points during the course of the day.

6. Wear shoes made out of canvas, leather, or suede. Do not wear shoes made out of plastic, or another material that does not breathe.

7. Wear shoes you can easily adjust. They should have laces, Velcro, or buckles.

8. Wear clean dry cotton socks every day.

9. Do not wear stockings with seams that can cause pressure points.

10. Wear socks to bed if your feet are cold to limit your exposure to the cold to prevent frostbite.

Selecting foot wear

Fitting of footwear is very important. Poorly fitted shoes are a common cause of problems in the foot of those with diabetes. Some advice:

- Get your feet measured each time you buy new shoes (foot size and shape change over time).
- They should fit both the length and width of the foot, with plenty of room for the toes.
- Avoid shoes with high heels, pointed toes or tight around the toes (these put too much pressure on parts of the foot and can contribute to ulcers)

d. Foot exercise

- Keep the blood flowing to your feet. Put your feet up when sitting. Wiggle your toes and move your ankles up and down at least 2 or 3 times a day. Don't cross your legs for long periods of time.
- Avoid sitting with legs crossed or standing in one position for long periods of time.
- If you smoke, stop. It decreases blood flow to the feet.

ACUTE COMPLICATIONS OF DIABETES MELLITUS

HYPOGLYCEMIA

Hypoglycemia occurs when the blood glucose falls to <50-60 mg/dl.

Clinical manifestation

- Sweating
- Tremor
- Tachycardia
- Palpitation
- Nervousness
- Hunger

Management

The immediate treatment for hypoglycemia is, 15 gram of a fast acting concentrated source of carbohydrate such as the following, given orally,

- 3 or 4 commercially prepared glucose tablets.
- 2 to 3 tsp of sugar or honey.

When you fall sick

- Be aware that your blood glucose may increase while you are sick. Check your blood glucose every 4 hours to make proper adjustments.
- Keep taking your diabetes medication as usual.
- If your blood glucose is over 300 mg/dl check your urine for ketones.
- To avoid dehydration, drink plenty of liquids-calorie free, or water. If you are unable to eat solid foods, include some liquids with carbohydrate.
- Call your doctor if you are unable to keep food or liquid down, you have a high fever, or you have ketones in your urine. Dehydration from vomiting or infection can lead to diabetic ketoacidosis. Ketones in the urine are an early indicator that this may be a concern.

HYPERGLYCEMIA

It refers to elevated blood glucose level fasting level - > 110 mg/dl; 2 hrs postprandial level >140 mg/dl.

Clinical manifestations

- Increased urination
- Weakness
- Blurred vision
- Headache
- Nausea and Vomiting
- Abdominal cramps.

Management

- Consult physician.
- Continuance of diabetic medication as ordered .
- Frequent checking of blood and urine specimen and recording of results.

LONGTERM COMPLICATIONS

Macrovascular complications

- Coronary artery disease
- Cerebro vascular disease
- Peripheral vascular disease

Micro vascular complications

Diabetic retinopathy Diabetic nephropathy Diabetic neuropathy

Preventing complications of diabetes mellitus

Complications include,

- Cataracts
- Damage to blood vessels that supply the legs and feet (peripheral vascular disease)
- Diabetic retinopathy (eye disease)
- Foot sores or ulcers, which can result in amputation
- Glaucoma
- High blood pressure
- High cholesterol
- Kidney disease and kidney failure (diabetic nephropathy)
- Macular edema
- Nerve damage, which causes pain and numbness in the feet, as well as a number of other problems with the stomach and intestines, heart, and other body organs

- Stroke
- Worsening of eyesight or even blindness
- Erection problems
- Infections of the skin, female genital tract, and urinary tract

Contact a Medical Professional if you have,

1. Chest pain or pressure
2. Fainting or unconsciousness
3. Seizure
4. Shortness of breath
5. Numbness, tingling, pain in your feet or legs
6. Problems with your eyesight
7. Sores or infections on your feet
8. Symptoms of high blood sugar (being very thirsty, having blurry vision, having dry skin, feeling weak or tired, needing to urinate a lot)
9. Symptoms of low blood sugar (weak or tired, trembling, sweating, feeling irritable, unclear thinking, fast heartbeat, double or blurry vision, feeling uneasy)

These symptoms can quickly get worse and become emergency conditions (such as convulsions or hypoglycemic coma).

LEVELS OF PREVENTION

Primary prevention

- ✓ Initiate eating habits based on the food pyramid in school age children.
- ✓ Promote avoidance of food high in refined sugars and saturated fats.
- ✓ Maintenance of ideal body weight starting in childhood.
- ✓ Perform regular exercise and follow healthy lifestyle.
- ✓ It is importance to return to pre-pregnancy weight or ideal body weight postpartum.

Secondary prevention

- ✓ Screen high risk individuals: people with first degree relatives with type 2 diabetes mellitus, obese individuals, members of high risk races, people older than 40 years with any other risk factor, individuals with hypertension and or hyperlipidemia, those with previous Impaired glucose tolerance, women with previous Gestational diabetes mellitus or a history of a baby weighing > 9 lb, and individuals with a history of recurrent infections.
- ✓ Perform periodic assessment to determine clients learning needs.
- ✓ Perform periodic examinations to assess glycemic control and screen for complications of diabetes. Utilize strategies shown to reduce complications of diabetes by team made up of healthcare providers and individuals with diabetes mellitus.
- ✓ Prevent hypoglycemia or hyperglycemia with stress or exercise by closely monitoring blood glucose levels and taking action.
- ✓ Perform daily foot care.

Tertiary prevention

- ✓ It is important to maintain the blood glucose levels to within as normal levels as possible.
- ✓ Follow the diabetic diet and exercise program to reduce obesity.
- ✓ It is a must to control of coexisting risk factors, such as hypertension and hyperlipidemia. No smoking.
- ✓ Avoidance of nephrotoxic drug, such as Non steroid anti inflammatory drugs is very important.
- ✓ Ensure prompt treatment of any foot abrasion or infection.
- ✓ Routinely have a follow-up to assess for complications of diabetes mellitus.

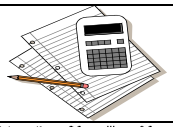
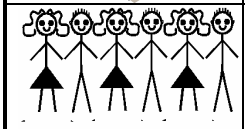
“ ARISE, AWAKE, STOP NOT TILL YOU REACH THE GOAL “

- Swami Vivekananda

Goals for self management of diabetes mellitus

Diabetes is a very serious disease which may cause damage to the blood vessels and nerves leading to the brain, eyes, heart, kidneys, toes and feet.

The following goals will help you gain and maintain diabetic control to reduce damage to your blood vessels and nerves.

	Goal 1: I will work hard to keep my HbA1c below 7.
	Goal 2: I will exercise (walk) 30 minutes ____ days per week. If I notice chest pain, shortness of breath or chest tightness, I will seek medical attention.
	Goal 3: I will check my feet daily. If I notice a sore or irritation I will seek medical attention. I will visit the Podiatrist yearly, or as instructed.
	Goal 4: I will follow my diabetic and low fat diet to reduce my blood sugar and cholesterol.
	Goal 5: I will try to obtain my ideal body weight. I will lose ____ pounds by my next office visit.
	Goal 7: I will stop smoking.
	Goal 8: I will have an eye exam and dental check-up every year or as indicated.
	Goal 9: I will check my blood sugar as instructed and will call if the results are consistently below 70 or above 180.
	Goal 10: I will talk about how I feel about having diabetes to family, friends, & or chaplain. I will attend the Diabetes Support Group.

Patient's Name: _____
MR No. : _____

APPENDIX – G

வடிவமைக்கப்பட்ட கற்பித்தல் நிகழ்ச்சி

நீரிழிவு நோய் வகை – 2 சுயபாதுகாப்பு முறைகள்

முன்னுரை

உலகின் அதிக அலவிளான நீரிழிவு நோய்கள் கொண்ட நாடாக இந்தியா விளங்குகிறது. அதனால் இந்தியா உலகில் நீரிழிவு நோயின் முதன்மை நாடு என்று அழைக்கப்படுகிறது. 2006 –ஆம் வருடம் உலக நீரிழிவு நோய் கூட்டமைப்பு வெளியிட்ட 'டையப்பிட்டீஸ் அட்லஸ்' – ன் படி சரியான தடுப்பு முறைகளை மேற்கொள்ளாவிட்டால் வரும் 2025–ஆம் ஆண்டுக்குள் இந்தியாவில் நீரிழிவு நோயாளிகளின் எண்ணிக்கை 40.9 மில்லியனிலிருந்து 69.9 மில்லியனாக உயரும் என கணிக்கப்பட்டுள்ளது.

நீரிழிவு நோயின் விளக்கம்

இது இன்சுலின் என்ற ஹார்மோன் செயல் படாததாலும் இன்சுலின் திசுக்களினால் சரியான அளவு உபயோகப்படுத்தப்படாமல் இருப்பதாலும் அல்லது இரண்டின் காரணமாக நீரிழிவு நோய் உண்டாகின்றது.

இன்சுலின் செயல்பாடுகள்

1. இது இரத்தத்தில் சர்க்கரையின் அளவை 70–120 மிகி/டெ.லி அளவாக வைப்பதற்கு உதவுகிறது.
2. குளுக்கோஸ் இரத்தத்திலிருந்து செல்களை கடக்கவும், செல்களை அடையவும் உதவுகிறது.
3. இரத்தத்தில் இன்சுலின், சர்க்கரையை கிளைகோஜனாக கல்லீரலிலும் தசைகளிலும் சேமித்து வைக்கிறது
4. குளுக்கோநியோஜெனிஸிஸை தடை செய்கிறது (கார்போஹட்ரேட் இல்லாத பொருட்களிலிருந்து குளுக்கோஸ் உற்பத்தியாகுதல்).
5. இரத்தத்தில் சர்க்கரை அளவு குறையும் போது கல்லீரலிலிருந்தும்

தசைகளிலிருந்தும் புரேட்டின் மற்றும் அடிப்போஸ் திசுக்கலிலிருந்தும் கொழுப்பு வெளியேற உதவுகிறது.

நீரிழிவு நோயின் காரணங்கள்

- பரம்பரையில் நீரிழிவு நோய் இருத்தல்
- உடல்பருமன்
- மது அருந்துதல்
- அதிக கொழுப்பு
- அதிக இரத்த அழுத்தம்
- வாழ்க்கை முறை மாற்றங்கள்
- கணையத்தில் ஏற்படும் பாதிப்பு
- கணைய புற்று நோய்
- மாத்திரைகள் (பீட்டா பிளாக்கர்ஸ், கால்சியம் சானல் பிளாக்கர்ஸ், கார்ட்டிகோஸ்டீராய்டு மற்றும் சில வகைகள்).

நீரிழிவு நோயின் வகைகள்

1. நீரிழிவு நோய் வகை – 1

இதில் கணையம் முழுமையாக பாதிக்கப்பட்டிருப்பதால், இன்சுலின் அறவே சுரக்காது. இவ்வகை உள்ளவர்கள் இன்சுலினை ஊசி மூலம் எடுத்துக் கொள்ள வேண்டும் மற்றும் உணவின் மூலம் இன்சுலினை சமப்படுத்திக் கொள்ள வேண்டும். இதை இன்சுலினை சார்ந்திருக்கும் நீரழிவு நோய் என்றும் அழைப்பார்கள். பெரும்பாலும் சிறுவர்களிடத்தில் காணப்படும்.

2. நீரிழிவு நோய் வகை – 2

இதில் கணையத்தினால் குறிப்பிட்ட அளவு இன்சுலினை சுரக்க இயலாது அல்லது இன்சுலின் சரியாக வேலை செய்யாது, இரத்தத்தில் உள்ள சர்க்கரை

திசுக்களுக்கு செல்லாமல், இரத்தத்தில் அதிகரித்துக் கொண்டே இருக்கும். இவ்வகை நீரிழிவு நோயை, உணவு, உடற்பயிற்சி மற்றும் மருந்துகள் மூலம் கட்டுப்படுத்தலாம். இதை இன்சுலின் சாரா நீரிழிவு நோய் என்றும் அழைப்பார்கள். 40 வயது மேற்பட்டவர்களிடையே காணப்படும்.

3. கர்ப்பத்தின் போது ஏற்படும் நீரிழிவு நோய்

கர்பத்தின் போது பிளாசேன்டல் ஹார்மோன் சுரப்பிகளால் இன்சுலின் எதிர்ப்பாற்றல் அதிகரித்து இரத்தத்தில் சர்க்கரையின் அளவு அதிகரிக்கிறது. இது பிரசவத்திற்குப் பின் குணமாகிவிடும்.

4. செகன்டரி நீரிழிவு நோய்

இது வேறு ஏதாவது உடல் உபாதைகள் மூலம் ஏற்படும் அல்லது வேறு நோய்கான சிகிச்சைமுறையினால் ஏற்படும், அதாவது குஸ்ஸிங்க்ஸ் சின்ட்ரோம்,ஹைப்பர்தைராய்டு, டியூப் மூலம் கொடுக்கும் உணவு, மற்றும் மாத்திரைகள் அதாவது கார்ட்டிகோஸ்டிராய்டு, பினடாயின் போன்றவை. இந்த வகை நீரிழிவு நோயிக்கு சிகிச்சை மேற்கொண்டால் குணமாகிவிடும்.

நீரிழிவு நோயினால் உடலில் ஏற்படும் மாற்றங்கள்

இன்சுலின் தடுப்பாற்றல் என்றால் உடலில் உள்ள திசுக்கள் இன்சுலினுக்கு தக்கவாறு இயங்காது. ஆனால் கணையம் இன்சுலினை சரியாக உற்பத்தி செய்யும். நீரிழிவு நோய் என்பது இரத்த சர்க்கரையை, உடலில் உள்ள திசுக்கள் சரியாக உபயோகப்படுத்தாததாலும் இன்சுலின் என்ற ஹார்மோன் குறைவாக சுரக்கப்படுவதாலும் வருகிறது.

நீரிழிவு நோயின் அறிகுறிகள்

- சோர்வு
- தளர்வு
- தேக அசௌகரீயம்
- சுறுசுறுப்பின்மை

- அடிக்கடி சிறுநீர் கழித்தல்
- அதிக தாகம் எடுத்தல்
- கண்பார்வை மங்குதல்
- உடல் எடை குறைவு
- பிறப்புறுப்பில் அரிப்பு

நீரிழிவு நோயின் சோதனை முறைகள்

1. நோயாளியின் விபரங்களை சேகரித்தல்
2. உடல் பரிசோதனைகள்
   - இரத்த அழுத்த பரிசோதனை
   - உடல் அடர்த்தி பரிசோதனை
   - கண் பார்வை பரிசோதனை
   - பாதங்களை பரிசோதித்தல்
   - தோல் பரிசோதனை
   - நரம்புகளின் பரிசோதனை
   - வாய் பரிசோதனை
3. இரத்த பரிசோதனைகள்
   - சாப்பிடுவதற்கு முன் எடுக்கும் இரத்த சர்க்கரையின் அளவு
   - சாப்பிட்ட பிறகு எடுக்கும் இரத்த சர்க்கரையின் அளவு
   - கிளைக்கோசைலேட்டட் ஹிமோக்குளோபின் (எச்.பி.ஏ 1. சி)
   - இரத்த கொழுப்பின் அளவு
   - சீரம் எலக்ரோலைட்ஸ்
   - பிளட் யூரியா நைட்ரெஜன்
   - சீரம் கிரியாட்டினின்
4. சீறு நீரக பரிசோதனை
5. இசிஜி (சுருள்படம்)
   - இரத்தத்தில் சாதாரணமாக சர்க்கரையின் அளவு 70-120 மிகி/டெ.

சில நேரங்களில் இந்த அளவு 200 மிகி/டெ.லி யை விட அதிகரிக்கும். உணவு உட்கொள்ளுவதற்கு முன் இரத்தத்தில் சர்க்கரையின் அளவு 120 மிகி/டெ.லி அல்லது அதைவிட அதிகம் ஆகும்

- உணவு உட்கொண்ட பின் 2 மணி நேரம் கழித்து இரத்தத்தில் சர்க்கரையின் அளவு 200 மிகி/டெ.லி அல்லது அதை விட அதிகம் ஆகும்.
- குளுக்கோஸ் டாலரன்ஸ் டெஸ்ட் என்பது உறுதிபடுத்தும் சோதனையாகும்.

நீரிழிவு நோயின் சிகிச்சை முறைகள்

- உணவுக் கட்டுப்பாடு
- உடற்பயிற்சி
- சுய இரத்த சர்க்கரை அளவு பரிசோதனை
- மருந்துகள்
- நீரழிவுநோய் கல்வி

உணவுக் கட்டுப்பாட்டு முறைகள்

நீரிழிவு நோயின் உணவுக்கட்டுப்பாட்டின் மிக முக்கியமான நோக்கம், உணவு உட்கொள்ளுவதைக் கட்டுப்பாட்டுக்குள் வைத்து உடல் எடையை முறையாக பராமரித்தல் மற்றும் இரத்த சர்க்கரையின் அளவை கட்டுப்படுத்துவதே.

கார்போஹைட்ரேட் என்பது சர்க்கரை மற்றும் சர்க்கரை மூலக்கூறுகள் அடங்கிய உணவு ஆகும். இது அதிகமாக ரொட்டி, தானியங்கள், சிப்ஸ், பாஸ்தா, அரிசி, உருளைக்கிழங்கு, சோழம், பயிர் வகைகள், பழங்கள், பழச்சாருகள், பால் மற்றும் இனிப்பு வகைகளில் அதிகம் காணப்படும்.

உணவு உட்கொண்வுடன், கார்போஹைட்ரேட் சர்க்கரையாக மாறி இரத்தத்தில் சர்க்கரையின் அளவை அதிகப்படுத்தும். நீங்கள் உணவு உட்கொண்ட 2 மணி நேரத்திற்குப் பிறகு இரத்தத்தில் சர்க்கரை அளவு அதிகரித்தால் குறைவான கார்போஹைட்ரேட் அல்லது வேறுவிதமான

கார்போஹைட்ரேட் அடங்கிய உணவை உட்கொள்ளவேண்டும்.

கீழ்க்கண்ட உணவு பரிந்துரைகளை பின்பற்றினால் இதயநோய் மற்றும் உயர் இரத்த அழுத்த நோய் ஆகியவற்றை தடுக்கலாம்.

உணவுக்கட்டுப்பாட்டு நோக்கங்கள்

★ இருதய நோய் மற்றும் உயர் இரத்த அழுத்தம், நீரிழிவு நோய் உள்ளவர்களில் பரவலாக காணப்படுகிறது. குறைந்த உப்பு மற்றும் கொழுப்பு உள்ள உணவுகளை எடுத்துக் கொள்ள பரிந்துரைக்கப்படுகிறது. இதன் மூலம் மேல் கூறிய விளைவுகளை தவிர்க்கலாம்.

★ இரத்தத்தில் சர்க்கரையின் அளவை கட்டுப்படுத்துவது (அதாவது திடிரென அதிகமாகும் அல்லது திடிரென குறையும் சர்க்கரை அளவு). உடல் பருமனாக உள்ளவர்களுக்கு, உடல் எடையை குறைக்க உதவுகிறது.

★ உணவை தவிர்க்கக் கூடாது.

★ உடற்பயிற்சி, நோய்வாய்ப்படும்போது மற்றும் சில முக்கியமான தருணங்களில் மருத்துவரின் ஆலோசனைப் படி உணவு முறையை மாற்றி அமைக்க வேண்டும்.

★ மது அருந்துதல் மற்றும் புகைபிடித்தலை தவிர்க்க வேண்டும்.

★ கார்போஹட்ரேட் உணவுகளை முழுவதுமாக நீக்காமல் சிறிதளவு உணவில் சேர்க்க வேண்டும்.

★ நார்ச்சத்து உள்ள உணவுவகைகளை எடுத்துக் கொள்வது நல்லது.

★ மிகவும் குறைவாக கொழுப்பு, புரதம் போன்ற உணவுகளை உட்கொள்ளலாம்.

★ விலங்குகளில் இருந்து கிடைக்கும் கொழுப்புப் பொருட்களை குறைவாக உண்ண வேண்டும்.

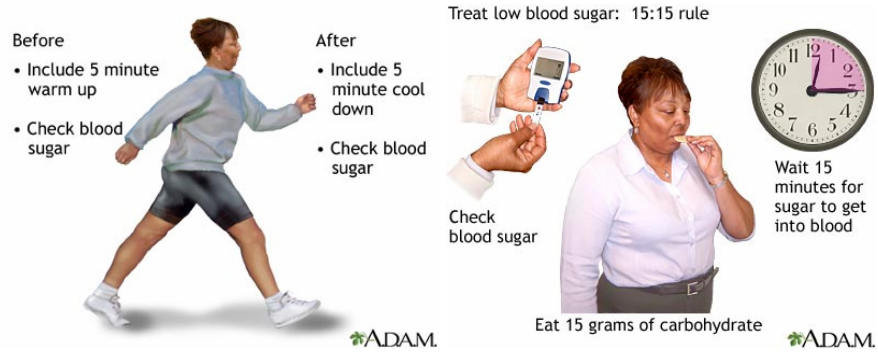
தவிர்க்க வேண்டிய உணவுப் பொருட்கள்

உடற்பயிற்சி

நீரிழிவு நோயில் உடற்பயிற்சி முக்கியமான பங்கு வகிக்கிறது. இது இரத்தத்தில் சர்க்கரையின் அளவை குறைக்கவும் இருதய நோயை தடுக்கவும் உதவுகிறது. உடற்பயிற்சியின் மூலம் இன்சுலின் உடலின் தசைகளில் உட்கிரகித்துக் கொள்ளும் திறன் அதிகரிக்கிறது. இதனால் இரத்தத்தில் சர்க்கரையின் அளவு குறைகிறது. வீட்டு வேலை, தோட்ட வேலை, அங்காடிக்குச் செல்லுதல் போன்ற வேலைகளில் ஈடுபடுதலால் இரத்தத்தில் உள்ள சர்க்கரையின் அளவைக் குறைக்கலாம்.

உடற்பயிற்சியின் நுணுக்கங்கள்

★ அநேக தசைகளை பயன்படுத்தும் உடற்பயிற்சியை மேற்கொள்ளுதல்.



★ வாரத்திற்கு 5 முறை உடற்பயிற்சி செய்தல் வேண்டும். நாள் ஒன்றுக்கு 45 நிமிடங்கள் -1 மணி நேரத்திற்கு நடைப்பயிற்சி செய்தல் வேண்டும்.

★ உடற்பயிற்சி பாதுகாப்பு முறைகளில் ஏதேனும் சந்தேகங்கள் வந்தால் அதை மருத்துவரை கேட்டு நிவர்த்தி செய்யலாம்

உடற்பயிற்சியின் போது பின்பற்ற வேண்டிய முன்னெச்சரிக்கைகள்

★ இரத்தத்தில் சர்க்கரை அதிகமாக இருக்கும் போது உடற்பயிற்சி மேற்கொண்டால் அது குளுக்ககான், வளர்ச்சி ஹார்மோன் மற்றும் கேட்டகோலமைனை அதிகமாக சுரக்கும். கல்லீரலும் அதிகமாக சர்க்கரையை சுரக்கும். இதனால் இரத்தத்தில் சர்க்கரையில் அளவு அதிகரிக்கும்.

★ நீரிழிவு நோய்க்கு மாத்திரை எடுத்துக் கொள்பவர்கள் இரத்த சர்க்கரை அளவு குறைந்தால் 15 கிராம் கார்போஹட்ரேட்டை எடுத்துக் கொள்ளலாம். இதனால் இரத்தத்தில் எதிர்பாராமல் ஏற்படும் சர்க்கரை அளவு குறைபாட்டை தவிர்க்கலாம்.

★ உடற்பயிற்சிக்குப் பின் ஏற்படும் இரத்தத்தின் சர்க்கரை குறைபாட்டை உடற்பயிற்சிக்குப் பின் சிறிது சிற்றுண்டி எடுத்துக் கொள்வதன் மூலம் தவிர்க்கலாம். தூங்குவதற்கு முன் இரத்தத்தின் சர்க்கரை அளவை பரிசோதிக்க வேண்டும்.

IDENTIFICATION CARD FOR DIABETES MELLITUS

Name :
Patient ID :
Date of registration :

★ உடல் பருமனாக உள்ளவர்களில் நீரிழிவு நோய் வகை -2 இருப்பவர்கள் உடற்பயிற்சி மற்றும் உணவுக்கட்டுப்பாடு மூலம் இரத்தத்தில் சர்க்கரையையும் உடலில் உள்ள கொழுப்பையும் குறைக்க உதவும்.

மருந்து மூலம் சிகிச்சை அளித்தல்

நீரிழிவு நோயின் வகை – 2ல், ஒருவர் நோயினாலோ, தொற்றுநோயினலோ, பிரசவத்தினாலோ, அறுவைசிகிச்சை அல்லது வேறு சம்பவத்தினாலோ, சர்க்கரையை உணவு மற்றும் மருந்துகள் மூலம் கட்டுப்பாட்டிற்குள் வைக்க முடியவில்லை என்றால் இன்சுலினை நீண்ட நாட்களாக கொடுத்து இரத்த சர்க்கரையின் அளவை கட்டுப்படுத்துகிறார்கள்.

மாத்திரைகள்

மருத்துவரின் அறிவுரைப்படியே மருந்துகளையும் அதன் அளவையும் தீர்மானித்தல் வேண்டும். நோயாளியின் உணவு முறைமற்றும் உடற்பயிற்சி செய்யும் பழக்கம் ஆகியவற்றை கருத்தில் கொண்டு மருந்தின் அளவு தீர்மானிக்கப்பட வேண்டும்.

இரத்தம் மற்றும் சிறுநீரில் இருக்கும் சர்க்கரையின் அளவினை அடிக்கடி போதுமான இடைவெளியில் பரிசோதித்து மருத்துவரின் ஆலோசனைப்படி இன்சுலின் அல்லது மாத்திரைகளை கூட குறைத்துக் கொள்ள வேண்டும்.

வாய்வழி உட்கொள்ளும் மாத்திரைகள்

1. முதல் ஜெனரேசன் சல்போனைல் யூரியா

★ குளோப்ரோப்பமைட்

★ டோலஸமைட்

2. இரண்டாம் ஜெனரேசன் சல்போனைல்யூரியா

★ கிளைப்பிசைட்

★ கிளிமிபிரைட்

3. பிகுஅனைடு

★ மெட்பார்மின்

4. ஆல்பா குளுக்கோசைடேஸ் இன்ஹிபிட்டர்ஸ்

★ அகர்போஸ்

5. தைஅசோலிடினிடியன்ஸ்

★ பையோகிளைடஜோன்

6. மெக்ளிடினைட்ஸ்

★ ரிபாகிளைனைடு

இரத்தத்தில் சர்க்கரையின் அளவை பரிசோதித்தல்

1. கிளைக்கோசைலேட்டட் ஹீமோகுளோபின்

இந்த இரத்த பரிசோதனை இரண்டு முதல் மூன்று மாதங்களில் உள்ள சராசரியாக உள்ள இரத்த சர்க்கரை அளவை பிரதிபளிக்கிறது. அதிகப்படியான சர்க்கரை, இரத்தத்தில் இருந்தால் அது இரத்த சிவப்பு அணுக்களில் சேர்ந்து,

இந்த கிளைக்கோசைலேட்டட் ஹிமோகுளோபின் அளவை அதிகரிக்கிறது.

3. சர்க்கரை நோய்க்கான சிறுநீர் பரிசோதனை

எஸ்.எம்.பி.ஜிவிற்கு முன் சர்க்கரையின் அளவை கண்டுபிடிக்க, இந்த சிறுநீர் சர்க்கரை பரிசோதனை மட்டும் தினமும் செய்யக்கூடியதாக இருந்தது. இந்த பரிசோதனை தற்போது, இதை செய்ய முடியாதவர்கள் அல்லது செய்ய விரும்பாதவர்களினால் குறைந்துள்ளது. இது எஸ்.எம்.பி.ஜி யை விட மலிவான பரிசோதனை.

பாதங்கள் பராமரிப்பின் முக்கியத்துவம்

- ★ உணர்ச்சியை அதிகரிக்கிறது.
- ★ இரத்த ஓட்டத்தை அதிகரிக்கிறது.
- ★ பாதங்களை சுத்தமாக வைக்க உதவுகிறது.
- ★ பாதங்களை மென்மையாக வைக்க உதவுகிறது.
- ★ தோலில் வரும் பாதிப்புகளை தவிர்க்கிறது.
- ★ கால்களில் வரும் பாதிப்புகளை தவிர்க்கிறது.

பாதத்தில் ஏற்படும் பாதிப்புகளை தவிர்க்கும் முறைகள்

- ✓ கட்டுப்பாடுள்ள உணவு, மருந்து, உடற்பயிற்சியை பின்பற்ற வேண்டும்
- ✓ இரத்தத்தில் குளுக்கோஸ் அளவை கட்டுப்படுத்த வேண்டும்.
- ✓ தினமும் பாதங்களை பரிசோதித்தல் வேண்டும். பொதுவாக மேல் பகுதி பாதத்தின் இரு பக்கங்கள், குதி கால், கால்விரல்களுக்கு இடைப்பட்ட பகுதியை தினமும் கவனிக்க வேண்டும்.சிறு பாதிப்பு இருந்தாலும் கவனமாக பார்க்க வேண்டும். ஏதேனும் இயல்பற்ற நிலையில் இருந்தால், அதை மருத்துவரிடம் தெரிவிக்க வேண்டும்.
- ✓ பாதங்களில் கொப்புளங்கள், வெட்டுக்காயம், வீக்கம் மற்றும் தோல்கள் சிவந்தும் காணப்பட்டால் உடனடியாக மருத்துவரை அணுகவும்.
- ✓ ஈரப்பதமுள்ள கிரீம்களை பயன்படுத்த வேண்டும். (விரல்களுக்கு இடையில் பூசக்கூடாது) இதன் மூலம் உலர்ந்த தோல் மற்றும் வெடிப்புகளை

தவிர்க்கலாம்.

✓ பருத்தியால் ஆன கால் உறையை பயன் படுத்த வேண்டும். பாதங்கள் குளிராக இருக்கம் போது காலுறை அணிந்து பாதம் வெளிப்படுவகை தவிர்க்க வேண்டும்.

✓ வீட்டில் நடக்கும் பாதையில் உள்ள தடைகளை நீக்க வேண்டும். இதன் மூலம் பாதங்களில் அடிபடாமல் பாதுகாக்கலாம்.

✓ நல்ல வெளிச்சம் தரும் மின்விளக்குகளை பயன்படுத்த வேண்டும்.

✓ தினமும் பாதங்களை வெதுவெதுப்பான தண்ணீருடன் சோப்பு சேர்த்து கழுவி, பிறகு அதை ஈரப்பதமின்றி உலரவைக்க வேண்டும். முக்கியமாக விரல்களுக்கு இடைப்பட்ட பகுதிகளை பாதுகாக்க வேண்டும் மற்றும் அதிக சோப்பு உபயோகித்தலை குறைக்கவும்.

✓ பாதத்திலுள்ள நகங்களை வெட்டுவதற்கு முன் பாதத்தை மிதமான தண்ணீரில் நனைத்து எடுக்க வேண்டும். பிறகு நகங்களை நேராக வெட்ட வேண்டும்.

✓ குளித்த பிறகு பாதங்களுக்கு எண்னெய் அல்லது மிருதுவான லோஷன் தடவவும். ஏனெனில் நீரழிவு நோய் உள்ளவர்களின் பாதம் எளிதில் உலர்ந்து வெடிப்பு ஏற்பட்டு புண்ணாகிவிடுகிறது.

✓ பாதத்தை சுடு தண்ணீரில் நனைப்பதற்கு முன்னால் தண்ணீரின் வெட்ப நிலை பார்க்க வேண்டும். ஏனெனில் அதிக வெப்பநிலை எளிதாக புண்ணாவதற்கு காரணமாகிவிடும்.

✓ கால்களில் எப்பொழுதும் காலணியை அணிய வேண்டும். ஒரு போதும் செருப்பு அணியாது அல்லது வெறுங்காலுடன் நடக்கக்கூடாது. காலணியை எப்போதும் அணிந்து, அடிபடுதலை தவிர்க்க வேண்டும்.

✓ சரியான அளவுள்ள காலணியை அணிந்து பாதங்களை பாதுகாக்க வேண்டும்.

✓ முறையான உடற்பயிற்சியின் மூலம் பாதங்களில் உள்ள எலும்பு மற்றறும் தசைகள் வலுபெறும், இரத்த ஒட்டம் அதிகரிக்கும் மற்றும் இரத்தத்தில்

சர்க்கரை அளவை கட்டுக்குள் வைக்கலாம். எந்த உடற்பயிற்சியையும் மேற்கொள்ளும் முன் உங்கள் மருத்துவரை அணுக வேண்டும்.

✓ தினமும் உடற்பயிற்சி செய்து இரத்த ஓட்டத்தை சீர்படுத்த வேண்டும். ஒரே நிலையில் அதிக நேரம் நிற்பதை தடுக்க வேண்டும்.

✓ தொடர்ச்சியாக மருத்துவரை அணுகவேண்டும்.

✓ சூடான தண்ணீர் பை மற்றும் சூடான துணி ஒத்தடங்களை உபயோகிக்கக் கூடாது.

✓ புகைப்பிடிப்பதை தவிர்க்க வேண்டும். ஏனெனில் பாதத்திற்கு செல்லும் இரத்த ஓட்டத்தை தடை செய்கிறது

குறுகிய கால பாதிப்புகள்

- ஹைப்போகிளைசீமியா
- ஹைப்பர்கிளைசீமியா
- டயபட்பிடிக்கீட்டோ அசிடோசிஸ்

இவைகளில் முக்கிய மான குறுகிய கால பாதிப்புகளான ஹைப்போகிளைசீமியா மற்றும் ஹைப்பர்கிளைசீமியா ஆகியவற்றைப் பற்றி பார்ப்போம்.

குறுகிய கால பாதிப்புகள்

ஹைப்போகிளைசீமியா

இரத்தத்தில் சர்க்கரை அளவு 70 மி.கி/டெ.லியை விட குறைந்தால் இது ஏற்படுகிறது.

அறிகுறிகள்

- ❖ வியர்த்தல்
- ❖ நடுக்கம்
- ❖ படபடப்பு

- ❖ இதயத்துடிப்பு அதிகரித்தல்
- ❖ தளர்வு
- ❖ கூடுதல் பசி

காரணங்கள்

- ❖ அதிக அளவு இன்சுலின் மற்றும் குறைந்த அளவு இரத்த சர்க்கரை விகிதங்களினால் ஏற்படுகிறது.
- ❖ உணவு உண்பது மற்றும் இன்சுலினின் உச்சகட்ட செயல்பாடுகளில் ஏற்படும் வேறுபடுகள் மூலம் அதிக அளவு இன்சுலின் அல்லது நீரழிவு நோய்க்கான மருந்துகள் எடுப்பதின் மூலம் ஏற்படுகிறது.
- ❖ வழக்கத்திற்கு மாறான உடற்பயிற்சி மற்றும் உணவு உட்கொள்ளுவதில் தாமதமானால் ஏற்படுகிறது.

ஹைப்பபோகிளைசீமியாவை சரிசெய்யும் முறைகள்

இதை சரிசெய்வதற்கு 15 கிராம் வேகமாக வேலை செய்யும் கார்போஹைட்ரேட்டை கீழ்க்கண்டவற்றின் மூலம் எடுத்துக்கொள்ளலாம்.

- ✓ 3-4 சர்க்கரை மாத்திரைகள்
- ✓ 2-3 மேஜைக்கரண்டி சர்க்கரை அல்லது தேன்

உடல் நிலை சரியில்லாத போது செய்ய வேண்டியவை

- ✓ உடல் நிலை சரியில்லாத போது இரத்தத்தில் சர்க்கரை அதிகரிக்க வாய்ப்பு உள்ளது. தங்களின் இரத்தத்தில் உள்ள சர்க்கரையை 4 மணி நேரத்திற்கு ஒரு முறை சரி பார்த்துக் கொள்ள வேண்டும்.
- ✓ நீரிழிவு நோய்க்கான மாத்திரைகளை வழக்கம் போல் எடுத்துக் கொள்ள வேண்டும்.
- ✓ இரத்தத்தில் சர்க்கரை 300 மிகி/டெ.லிக்கும் அதிகமாக இருந்தால், சிறுநீரில் கீட்டோன்ஸ் இருக்கின்றதா என்று சோதிக்க வேண்டும்.
- ✓ நீர் இழப்பைத்தவிர்க, அதிகமாக தண்ணீர் அல்லது நீராகாரம் பருக

வேண்டும். கெட்டியான உணவுகளை எடுத்துக்கொள்ள இயலவில்லை என்றால் நீராகாரமாக சிறிது கார்பேஹைட்ரேட்டுடன் எடுத்துக் கொள்ள வேண்டும்.

- ✓ சரியான உணவு உண்ணவோ, அதிகமாக காய்ச்சல், அல்லது கீட்டோன்ஸ் சிறு நீரில் இருந்தால் தங்களின் மருத்துவரை அணுக வேண்டும். வாந்தி அல்லது தொற்று நோயினால் ஏற்படும் நீரிழப்பால் டயப ட்டிக் கீட்டோஅசிடோசிஸ் ஏற்பட வாய்ப்பு உள்ளது. சிறுநீரில் கீட்டோன்ஸ் இருந்தால், அது ஒரு முக்கிய பாதிப்பிற்கான அறிகுறி ஆகும்.

ஹைப்பர்கிளைசீமியா

இரத்தத்தில் சர்க்கரையின் அளவு, சாப்பிடுவதற்கு முன் 110 மிகி/டெ.லிக்கும் மேல் அல்லது சாப்பிட்ட பின் 2 மணிநேரம் கழித்து 140 மிகி/டெ.லிக்கும் அதிகமாக இருந்தால் ஹைப்பர்கிளைசீமியா என்று அழைக்கப்படுகிறது.

காரணங்கள்

- ✓ அதிக அளவு உணவு உட்கொள்ளுதல் மூலம் ஏற்படுகிறது.
- ✓ மிக குறைந்த அளவு இன்சுலின் அல்லது இன்சுலின் இல்லாமை.
- ✓ உடற்பயிற்சியைத்தவிர்த்தல் மூலம் ஏற்படுகறிது.
- ✓ தரமில்லாத இன்சுலின் உபயோகிப்பதன் மூலம் ஏற்படுகறிது.
- ✓ உடல் மற்றும் மன அழுத்தம் மூலம் ஏற்படுகறிது.
- ✓ இன்சுலின் மிகக்குறைந்த அளவு உட்கிரகிக்கப்படுதல் மூலம் ஏற்படுகறிது.
- ✓ கூடுதல் தொற்று நோய் நிகழ்வுகள் மூலம் ஏற்படுகறிது.

ஹைப்பர்கிளைசீமியா அறிகுறிகள்

- ✓ அதிகமாக சிறுநீர் கழித்தல்
- ✓ தளர்வு

- ✓ கண் பார்வை மங்குதல்
- ✓ தலைவலி
- ✓ வாந்தி எடுப்பது போன்ற உணர்வு மற்றும் வாந்தி எடுத்தல்

ஹைப்பர்கிளைசீமியாவை சரி செய்யும் முறைகள்

- ✓ மருத்துவரை அணுகுதல்
- ✓ நீரிழிவு நோய்க்கான மாத்திரைகளை எடுத்துக் கொள்ளுதல்
- ✓ அடிக்கடி இரத்தம் மற்றும் சிறுநீரை சர்க்கரை இருக்கிறதா என்று பரிசோதனை செய்து அதை அட்டவணைப்படுத்துதல்.

நீண்டகால பாதிப்புகள்

சிறிய இரத்தக் குழாய் பாதிப்புகள்

- ★ விழித்திரை பாதிப்பு சிறு நீரக பாதிப்பு நரம்பு பாதிப்பு

பெரிய இரத்தக் குழாய் பாதிப்புகள்

- ★ இருதயத்தில் ஏற்படும் பாதிப்புகள்
- ★ மூளையில் ஏற்படும் பாதிப்புகள்
- ★ இரத்தகுழாய் சம்பந்தமான பாதிப்புகள்

இவைகளில் முக்கியமான நரம்பில் ஏற்படும் பாதிப்பு பற்றி பார்ப்போம்.

நரம்பில் ஏற்படும் பாதிப்பு

நீரிழிவு நோயினால் நரம்புகள் பாதிக்கப்படுகிறது.

காரணங்கள்

தொடர்ச்சியான ஹைப்போகிளைசீமியா மூலம் புருக்டோஸ் இரத்தத்தில் சேருகின்றது. இதன் மூலம் இரத்த நாளங்கள் சுருங்குவதால் நரம்புகள் பாதிக்கப்படுகின்றன.

அறிகுறிகள்

எல்லா உறுப்பு மண்டலங்களும் பாதிக்கப்படுகின்றது.

1. மலம் கழிப்பதில் கட்டுப்பாடற்ற தன்மை
2. பேதி
3. சிறுநீர் கழிப்பதில் பிரச்சனை
4. உணவுக்குழாய் காலியாவதில் தாமதமான நிலை.
5. இரத்த நாளங்களில் ஏற்படும் பிரச்சனைகள்.

இரத்த ஓட்டம் செல்களுக்கு போவதைத் தடுக்கிறது. அதனால் பிராணவாயு உணவுப் பொருட்கள் செல்களுக்கு செல்வது தடைப்பட்டு காய்ங்கள் ஆறுவதில் காலதாமதம் ஏற்படுகிறது.

அறிகுறிகள்

★ இடைஇடையே வரும் கால் வலி.

★ ஓய்வின் போது கால் வலி ஏற்படுதல்.

★ பாதங்களில் குளிர்ச்சி.

★ இரத்த நாளங்கள் தாமதமாக இரத்தத்தால் நிரப்பப்படுதல்.

நீரிழிவு நோயைத்தடுக்கும் நிலைகள்

1 முதல் நிலை தடுப்பு.

- சிறு வயது முதலே உணவு பழக்கவழக்கங்களை உணவு அட்டவனைப் படி தொடங்க வேண்டும்.
- கொழுப்பு நிறைந்த உணவுகளை தவிர்க்க வேண்டும்.
- சிறு குழந்தை முதலே அளவான உடல் எடையை ஊக்குவிக்க வேண்டும்
- வழக்கமான உடற்பயிற்சியின் அவசியத்தை உணர்த்த வேண்டும்.
- அளவான உடல் எடையின் அவசியத்தை கருவுறுதலுக்கு முன்பும், குழந்தை பிறந்த பின்பும் உணர்த்த வேண்டும்.

2. இரண்டாம் நிலை தடுப்பு

- அதிக பாதிப்புக்குள்ளாகுபவரைக் கண்டறிதல் (இரண்டாம் வகை சர்க்கரை நோயாளிகளின் உறவினர்கள், உடல் பருமனுடையவர்கள், 40 வயதிற்கும் அதிகமானவர்கள் இரத்த அழுத்தம் உள்ளவர்கள்)
- இரத்த சர்க்கரை அளவைக் கட்டுப்படுத்தவும், பின்விளைவுகளைத் தடுக்கவும் அடிக்கடி பரிசோதனை செய்ய வேண்டும்.
- மருத்துவக் குழு வல்லுனர்கள் சர்க்கரை நோயின் விளைவுகளைக் குறைக்கும் முறைகளை எடுத்துக் கூற வேண்டும்.
- உடற்பயிற்சியினால் உண்டாகும் இரத்த சர்க்கரை அளவு குறைவை இரத்த பரிசோதனை மூலம் தெரிந்து கொள்ள வேண்டும்.
- தினமும் பாதங்களை நன்றாக பராமரிக்க வேண்டும்.

3. மூன்றாம் நிலை தடுப்பு

- இரத்த சர்க்கரை அளவை கட்டுப்பாட்டுக்குள் வைத்திருப்பதின் அவசியத்தை வலியுறுத்த வேண்டும்
- உடல் பருமனைக் குறைக்க உணவு மற்றும் உடற்பயிற்சி வழக்கங்கள் பற்றி எடுத்துரைக்க வேண்டும்.
- இரத்த அழுத்தம் மற்றும் இரத்தத்தில் கொழுப்பு ஆகியவற்றை கட்டுப்பாட்டுக்குள் வைக்குமாறு கூற வேண்டும்.
- புகைப்பிடித்தல் கூடாது.
- சிறுநீரகத்தைப் பாதிக்கும் மருந்துகளான நான் ஸ்டீராய்டல் ஆன்டி இன்ஃப்ள மேட்டரி மருந்து ஆகியவற்றை தவிர்க்க வேண்டும்.
- பாதப்புண் மற்றும் சிராய்ப்பு இருந்தால் தகுந்த மருந்து எடுத்துக் கொள்ள வேண்டும்.
- சர்க்கரை நோயாளிகளின் தேவைகளை அறிந்து கொள்ள அடிக்கடி மருத்துவரை அனுகுமாறு கூற வேண்டும் சர்க்கரை நோயின் பின்விளைவுகளை கண்டறிய வழக்கமான அணுகு முறையைப் பற்றி கூற வேண்டும்.

முடிவுரை

இதுவரை நாம் நீரிழிவு நோயின் விளக்கம், காரணங்கள், அறிகுறி, பரிசோதிக்கும் முறைகள், சிகிச்சை முறைகள், பாதிப்புகள் மற்றும் அதன் தடுப்பு முறைகள் ஆகியவற்றைப் பார்த்தோம். மேற் கூறியவற்றில் ஏதேனும் சந்தேகம் உள்ளதா ? நீங்கள் இதுவரை பொறுமையாக இருந்து கவனித்ததற்கு மிக்க நன்றி.

“ ஒவ்வொரு மானிடனும் தனது ஆரோக்கியத்திற்கும் வியாதிக்கும் அவனே காரணகர்த்தா ஆவான்“

(சிவானந்தர்)

MODULE ON

SELF MANAGEMENT OF TYPE 2 DIABETES MELLITUS

IF YOU TAKE CHARGE
YOU CAN CONTROL DIABETES MELLITUS!

SELF MANAGEMENT OF TYPE 2 DIABETES MELLITUS

INTRODUCTION

India leads the world with largest number of diabetic patients. India is termed as **"Diabetes capital of the world".** The rising incidence of diabetes mellitus and its complications are going to pose a grave health care burden on our country. Timely effective interventions or measures and screening tests for complications at the time of diagnosis becomes imperative not only for early detection, but also to prevent progression to end stage disease. Simple interventional strategies like ***"Eat less, Eat on time and Walk more"*** can go a long way in preventing these chronic disorders among present as well as in the future generations.

DEFINITION

Diabetes mellitus is a multisystem disease related to abnormal insulin production, impaired insulin utilization, or both.

RISK FACTORS

- Heredity
- Obesity
- Alcohol consumption
- High cholesterol
- Hypertension
- Acromegaly
- Cusing's syndrome
- Thyrotoxicosis
- Pheochromocytoma
- Chronic pancreatitis
- Cancer
- Drugs (Beta blockers, Calcium channel blockers, Corticosteroids, Thiazide diuretics, Fluoroquinolones, etc)

TYPES OF DIABETES MELLITUS

Type 1diabetes mellitus

In type 1 diabetes the cells that produce insulin are damaged or destroyed so the pancreas is no longer able to make any insulin. Persons with type 1 diabetes need to take injected insulin and learn to balance their insulin with their food choices.

Type 2 diabetes mellitus

In type 2 diabetes your body is either unable to make enough insulin or your insulin no longer works right. The glucose in your blood cannot get from the blood into the cells and becomes elevated.

Gestational diabetes mellitus

It is any degree of glucose intolerance with its onset during pregnancy. Hyperglycemia develops during pregnancy because of the secretion of placental hormones, which causes insulin resistance.

Secondary diabetes mellitus

Occurs because of another medical condition or due to treatment of a medical condition that causes abnormal blood glucose levels. Conditions causing secondary diabetes includes cushing syndrome, hyperthyroidism, use of parenteral nutrition, medications like corticosteroids, phenytoin, antipsychotics. This resolves when underlying condition is treated.

SIGNS AND SYMPTOMS

- Fatigue
- Generalized weakness
- Malaise
- Excessive urine production
- Excessive thirst
- Excessive fluid intake
- Blurred vision
- Unexplained weight loss and Lethargy
- Itching of external genitalia
- Excessive bowel movements

MANAGEMENT

Components of diabetes mellitus management:

- Nutritional management
- Exercise
- Monitoring
- Pharmacological therapy
- Education
-

NUTRITIONAL MANAGEMENT

The most important objective in the dietary and nutritional management of diabetes mellitus is control of total caloric intake to attain or maintain a reasonable body weight and control of blood glucose levels.

Carbohydrates are converted to glucose, they directly affect blood glucose levels. If your blood glucose is high 2 hours after meals, you might try less carbohydrate or a different type of carbohydrate. Because heart disease and high blood pressure are common in persons with diabetes, it is good to follow nutrition suggestions such as low salt and low fat to help prevent these concerns.

Nutritional guidelines

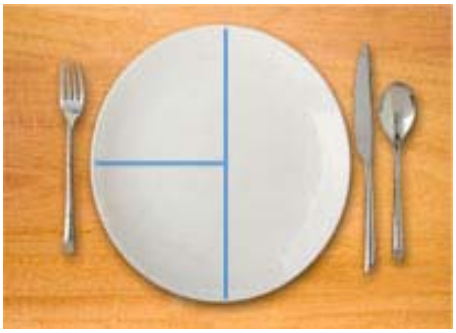
16. Eating at the same time and same amount of food every day is important for some people, especially those who take diabetic drugs.
17. If a meal is skipped or delayed while on these regimens, you are at risk for developing low blood glucose.
18. Losing even a small amount of weight (5 to 10 percent of total body weight) can help the body to produce and use insulin more efficiently. In fact, eating fewer calories can reduce blood sugar levels even before the first pound is lost.
19. The number of calories needed to maintain weight depends upon your age, sex, height, weight, and activity level. In general:

    - Men, active women - 15 calories/pound
    - Most women, sedentary men, and adults over 55 years - 13 cal/lb
    - Sedentary women, obese adults - 10 cal/lb
    - Pregnant, lactating women - 15 to 17 cal/lb

20. A standard diabetic diet is low in carbohydrates, high in fibers and low in fats. Following a diabetic diet does not mean that one should completely avoid eating foods that contain carbohydrates. .
21. Foods high in fiber help in lowering the increased blood sugar level, since they delay the sugar absorption in the body and decrease the need for exogenous insulin. Moreover, dietary fiber foods also help in lowering bad cholesterol in the body. Whole grains, fresh fruits and vegetables are some of the foods that are high in fiber.
22. Diabetic patients should strictly avoid eating foods high in fats. Such foods worsen the symptoms of diabetes and also increase risk of developing other health problems like heart diseases.
23. Along with a diet plan, follow an exercise routine. This will help you to maintain normal blood sugar level and also reduces risk of other health problems.
24. Avoid eating ready-made or processed food and rely on fresh fruits and vegetables.
25. Increase the consumption of fresh fruits and vegetables, since they are low in fats and provide all the required nutrients.
26. Foods high in carbohydrates like bread, potato and sugar, should be consumed in controlled quantity.
27. Minimize use of oils and sugar and make habit of following a sugar free regime.
28. Mixers, such as fruit juice or regular cola, can increase blood sugar levels and increase the number of calories consumed in a day.. . .
29. Adjusting the meal plan for exercise, illness and special occasions.
30. Avoid alcohol intake and smoking.

American Diabetes Association has given a guideline for meal planning as,

6. Using a dinner plate, draw an imaginary line down the middle of your plate, then divide the left side of your plate once more into 2 equal sections. Now you have 3 sections on your plate—2 small and 1 large.



7. For every meal, try to fill the largest section with nonstarchy vegetables such as spinach, carrots, lettuce, greens, green beans, broccoli, cauliflower, tomatoes, or cucumbers.
8. In 1 of the small sections, place starchy foods such as whole-grain breads, rice, pasta, peas, potatoes, corn, lima beans, low-fat crackers or chips.
9. In the other small section, put your low-fat meat such as a small piece of chicken, lean beef, or pork; or go with high-protein meat substitutes such as eggs, or low-fat cheese.
10. Add a low-fat drink and a piece of fruit for dessert.

To avoid weight gain, the following tips are recommended.

d. Measure your weight on a regular basis (eg, once weekly). Weight gains of more than 2 to 3 pounds indicate a need to decrease the amount you eat or increase activity.
e. As blood glucose level improves, it may be necessary to decrease your calorie intake by 250 to 300 calories per day to avoid weight gain.
f. If blood glucose levels are frequently low at a particular time of day, decrease the medication dose rather than add a snack.

Foods to be included

- Greens
- Vegetables – Plantain stem, plantain flower, radish, cabbage, bitter gourd, ladies finger, beans, ridge gourd, white ashgourd, brinjal, bottle gourd, onion, drumstick, knoll-khol, cucumber, tomato, cauliflower, pumpkin, capscicum, turnip, cho chomarrow.
- Any one fruit per day -1/2 apple, 1 sweet lime, 3 pieces papaya, 1 guava, 1 orange when sugar levels are under control.
- Plain soda water.
- Gingely oil, sunflower oil, groundnut oil (refined), olive oil.

Foods to be avoided

- Roots and tubers.
- Sugar, glucose, honey, jam, cake, chocolate, ice cream, concentrated milk preparations-kheer.
- Butter, ghee, vanaspathi, coconut oil.
- Nuts-ground nut, pista, cashewnuts, dried fruits-raisins.
- Aerated drinks, horlicks, boost, bournvita.
- Fatty mutton, beef, pork, liver, kidney, brain, heart.
- Fruits- banana, jack fruit, sapota, mango, grapes, custard apple.
- Alcohol, cigarette smoking.
- Tinned or canned foods.

Sample diet chart

Total calories: 1500 kilo calories

Low protein and low fat diabetic diet.

Time	Menu	Quantity
Early morning (6.00-7.00 a.m.)	Tea/Coffee without sugar with skimmed milk	1 cup + 2 Marie gold biscuits
Breakfast (8.00-9.00 a.m.)	Idly or Dosai or Chappathi or Pongal or Uppuma or Brown bread with Tomato or Mint chutney or Sambar	4 nos. 3 nos. 3 nos. 2 cups. 2 cups 4 slices
Mid-morning (11.00-11.30 a.m.)	Skimmed butter milk or Vegetable soup or Lime juice with salt Marie biscuit or Vegetable salad	1 cup 1 cup 1 cup 2 nos. 1 cup
Lunch (1.00-1.30 p.m.)	Rice or Chappathi Sambar Rasam Buttermilk Greens Vegetable	2 cup 1 cup (150 gram)
Evening snack (3.30-4.00 p.m.)	Brown bread or Sundal or Aval uppuma Tea/Coffee without sugar With skimmed milk	2 slices 1 cup (150 ml)
Mid evening (5.30-6.30 p.m.)	Vegetable soup/Skimmed butter milk	1 cup
Dinner (8.30-9.00 p.m.)	Same as lunch	
Bed time	Skimmed milk without sugar/Skimmed butter milk	1 cup

Note: Weekly once Motton or Chicken or Fish or Egg without yolk can be taken.

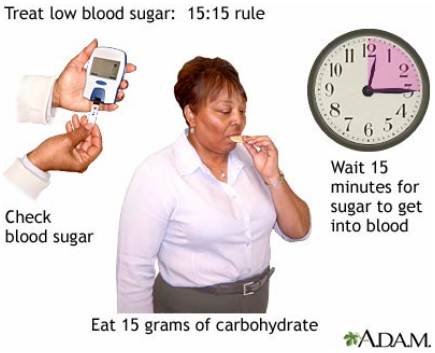
Exercise

Exercise guidelines

1. Start out easy and gradually increase intensity and duration. Warm up and cool down for 5 - 10 minutes to prevent heart problems as well as make you less susceptible to injury.
2. Don't exercise outdoors on very hot or humid days. You can get heat exhaustion or heat stroke.
3. In warm weather, dress in lightweight, light-colored, loose-fitting cotton clothing or special fabrics that promote heat loss. Wear a hat and apply sunscreen.
4. To prevent dehydration, drink a cup of cold water before and after you exercise.
5. If you exercise longer than 30 minutes or are sweating a lot, drink water during your workout.
6. Know the warning signs of heart problems: chest, arm or jaw pain, nausea, dizziness or fainting (also signs of heat exhaustion or hypoglycemia), unusual shortness of breath during exercise, irregular pulse.
7. In patients with extensive eye disease related to diabetes (diabetic retinopathy), the intensity and type of exercise may need to be limited. Activities that should be avoided include excessive straining (as in weight lifting), excessively jarring activities (such as boxing), and exercise that involves severe pressure changes (like diving). If there is early eye disease and no new vessel formation, no limitations are necessary. If kidney disease is present, the only precaution is avoiding exercise that can raise blood pressure.
8. The three key aspects in any exercise program are :

   FIT: i.e. Frequency, Intensity and Timing.

- Exercise should be done frequently i.e. at least 5 times a week.
- It should be intense. Exercise should be intense enough to burn sufficient calories.
- Timing: Minimum 45 minutes to one hour walking is important for getting maximum benefit.



The American Diabetes Association has published recommendations for exercise stress testing in diabetes patients who are having the following risks,

- Any patient with cardiac symptoms.
- Abnormal resting Electrocardiograph.
- Peripheral or carotid artery disease.
- Sedentary lifestyle, age > (greater than) 35 years, and plans to begin a vigorous exercise program.
- Two or more of the following risk factors in addition to diabetes.
- Total cholesterol > 240mg/dl, Low Density Lipoprotein-160mg/dl, or High Density Lipoprotein <35mg/dl.
- Blood pressure > 140/90.
- Smoking.
- Family history of premature heart disease.
- Kidney involvement from diabetes.

The American Diabetes Association has made the following recommendations for exercising:

- Carry an Identity card and wear a bracelet that identifies you as having diabetes.
- Be alert for signs of hypoglycemia during and after exercise.
- Drink plenty of fluids before, during, and after exercise.
- Measure blood sugar levels and act if the reading is less than 80mg/dl or greater than 240mg/dl.

IDENTIFICATION CARD FOR DIABETES MELLITUS

Name :
Patient ID :
Date of registration :

The benefits of exercise in patients with diabetes, and in those at high-risk for developing type 2 diabetes (and those with Syndrome X), may include the following:

9. Reduces heart diseases.
10. Prevention of diabetes in those at high risk.
11. Improved muscle sensitivity to insulin.

12. Better blood sugar control by utilizing glucose effectively, which reduces the amount of insulin needed.
13. Better blood cholesterol profiles.
14. Better blood pressure control.
15. Potential weight loss.
16. Exercise relieves stress and tension and a well-exercised body feels good.

Managing hypoglycemia during exercise

The increased glucose uptake by the muscles produces low blood glucose levels which can continue for 12 - 24 hours.

The warning signs for mild and moderate hypoglycemic reactions are: trembling or shakiness, rapid heart rate, palpitations, increased sweating, excessive hunger, headache, drowsiness, mental confusion, and abrupt mood changes.

Tips to manage hypoglycemic attack:

1. Take action even if you are not sure you have hypoglycemia-waiting can make your symptoms much worse.
2. Take a blood glucose test to confirm the problem.
3. Eat or drink foods with sugar such as 1/2 cup of fruit juice, six lifesavers, 1 small box of raisins, or 3 glucose tablets. Food with fat should be avoided because it blocks the absorption of sugar into the bloodstream.
4. Take at least a 10 - 15 minute rest and retest blood-glucose level before resuming exercise. Don't exercise if it's below 100 mg/dl or you still don't feel right.
5. If you do continue to exercise, be on the lookout for any signs that the hypoglycemic reaction is not over. Take your blood glucose level at least every 20 - 30 minutes during your workout. After your workout eat a complex carbohydrate snack (starchy food).
6. Measure blood sugars before, during, and after exercise.
7. For unplanned exercise, take 30 to 20g of carbohydrates extra for each 30 minutes of exercise.
8. If you exercise in the evening, you may need to add a snack before bedtime to make certain your sugars don't go too low at night.

Body Mass Index (BMI) chart

Healthy BMI is 23

Category	Category	Category
Underweight	<18.5	Low
Normal range	18.5 - 22.9	Average
Overweight (at risk)	23.0 – 24.9	Increased
Obese I	25 – 29.9	Moderate
Obese II	>30.0	Severe

Medication management

In type 2 diabetes mellitus, the pancreas cells continue producing insulin, but the cells develop a resistance to insulin, and in these cases, oral medicines are effective.

- Take your medicines at the same times each day.
- Talk with your doctor or diabetes teacher about the best times to take your diabetes medicines. Fill in the names of your diabetes medicines, when you should take them, and how much you should take.

ORAL ANTI DIABETIC AGENTS

1. First generation sulfonylureas
   - Chlorpropamide
   - Tolazamide
2. Second generation sulfonylureas
   - Glipizide
   - Glimepiride
3. Biguanides
   - Metformin
4. Alpha glucosidase inhibitors
   - Acarbose
5. Thiazolidinediones
   - Pioglitazone
6. Meglitinides
   - Repaglinide

Lifestyle management

Quitting smoking

Over 25 percent of people newly diagnosed with diabetes are smokers. Quitting smoking is one of the most important things a patient can do to improve their health.

Smokers with diabetes have an increased risk of the following:

- Death, especially from heart attacks and strokes.
- Higher level of Low density lipoprotein "bad" cholesterol levels.

- Worsened blood sugar controlled, compared to non-smokers.
- Nerve damage from diabetes.
- Kidney disease leading to dialysis.
- Foot ulcer and amputation of toes, feet or legs caused by peripheral vascular disease.

Performing blood sugar monitoring

The following steps include general guidelines for testing blood sugar levels; you should get specific details for your blood glucose monitors from the package insert or your healthcare provider.

9. Wash hands with soap and warm water. Dry hands.
10. Prepare the lancing device by inserting a fresh lancet. Lancets that are used more than once are not as sharp as a new lancet, and can cause more pain and injury to the skin.
11. Prepare the blood glucose meter and test strip.
12. Use the lancing device to obtain a small drop of blood from your fingertip .
13. Apply the blood drop to the test strip in the blood glucose meter. The results will be displayed on the meter after several seconds.
14. Dispose of the used lancet in a puncture-resistant sharps container (not in household trash).
15. Glycosylated hemoglobin is a relatively new blood test, which will give you the average blood sugar levels over the past 2-3 months. Glycosylated hemoglobin (HbA1c) as close to 7% which is the value termed as good control. Good control will go a long way in preventing diabetic complications.
16. You should review your blood sugar results regularly with a healthcare provider. The record should include the time and date, blood glucose result, and dose of medication used; additional notes about what you ate, exercise, and difficulties with illness or stress can also be helpful but are not generally required every day.

Foot care

Diabetes can damage your nerves. This, in turn, may make you less able to feel an injury or pressure on the skin of your foot. You may not notice a foot injury until severe damage or infection develops. The affected limb may need to be amputated if these skin ulcers do not improve, get larger, or go deeper into the skin.

a. Foot examination

5. Check your feet daily for cuts, blisters, red spots, swelling, anything that may not be normal. Use a mirror to check the bottoms of your feet or ask a family member for help if you have trouble seeing them or use a mirror to look under the foot if you can not see it. Look carefully at the top, sides, soles, heels, and between the toes. (Just before bedtime is a good time to do this).

6. If obesity prevents you from being physically able to inspect your feet, ask a family member, neighbor, or visiting nurse to perform this important check.
7. Report sores or other changes to your doctor immediately. Report all blisters, bruises, cuts, sores, or areas of redness.

8. Get a foot exam by your health care provider at least twice a year and learn whether you have nerve damage.

b. Cleaning foot

6. Wash your feet every day in warm(not hot) water and dry your feet well, particularly between the toes.
7. Keep the skin of your feet soft and smooth by rubbing a thin coat of skin lotion daily over the tops and bottoms of your feet, but not between your toes, to prevent dry skin and cracking.
8. Keep your toenails trimmed straight across and file the edges with an emery board or nail file. Soak your feet in lukewarm water to soften your nails before trimming.
9. Do not try to remove corns and callus yourself - see a Podiatrist for this; NEVER use commercial corn cures - this is so important in those with diabetes as it is so easy to damage the skin.
10. Do not apply a heating pad or hot water bottle to your feet. Avoid hot pavement or hot sandy beaches.

c. Foot wear

11. Always use a MCR foot wear where ever you go. Avoid going barefoot, even in your own home (this lessens the chance of some accidental damage)

    Wear comfortable shoes and socks. Walking barefoot can be a hazard to your feet.

12. Protect your feet from hot and cold by, for example, wearing shoes at the beach and on hot pavement and by wearing socks at night if your feet get cold.

13. Check the inside of your shoes for rough areas or torn pieces that can cause excess pressure or irritation.
14. Change or temporarily remove your shoes after 5 hours of wearing them during the day. This changes the pressure points during the course of the day.
15. Wear shoes made out of canvas, leather, or suede. Do not wear shoes made out of plastic, or another material that does not breathe.
16. Wear shoes you can easily adjust. They should have laces, Velcro, or buckles.
17. Wear clean dry cotton socks every day.
18. Do not wear stockings with seams that can cause pressure points.
19. Wear socks to bed if your feet are cold to limit your exposure to the cold to prevent frostbite.

Selecting foot wear

Fitting of footwear is very important. Poorly fitted shoes are a common cause of problems in the foot of those with diabetes. Some advice:

- Get your feet measured each time you buy new shoes (foot size and shape change over time).
- They should fit both the length and width of the foot, with plenty of room for the toes.
- Avoid shoes with high heels, pointed toes or tight around the toes (these put too much pressure on parts of the foot and can contribute to ulcers)

d. Foot exercise

- Keep the blood flowing to your feet. Put your feet up when sitting. Wiggle your toes and move your ankles up and down at least 2 or 3 times a day. Don't cross your legs for long periods of time.
- Avoid sitting with legs crossed or standing in one position for long periods of time.
- If you smoke, stop. It decreases blood flow to the feet.

ACUTE COMPLICATIONS OF DIABETES MELLITUS

HYPOGLYCEMIA

Hypoglycemia occurs when the blood glucose falls to <50-60 mg/dl.

Clinical manifestation

- Sweating
- Tremor
- Tachycardia
- Palpitation
- Nervousness
- Hunger

Management

The immediate treatment for hypoglycemia is, 15 gram of a fast acting concentrated source of carbohydrate such as the following, given orally;

- 3 or 4 commercially prepared glucose tablets.
- 2 to 3 tsp of sugar or honey.

When you fall sick

- Be aware that your blood glucose may increase while you are sick. Check your blood glucose every 4 hours to make proper adjustments.
- Keep taking your diabetes medication as usual.
- If your blood glucose is over 300 mg/dl check your urine for ketones.
- To avoid dehydration, drink plenty of liquids-calorie free, or water. If you are unable to eat solid foods, include some liquids with carbohydrate.
- Call your doctor if you are unable to keep food or liquid down, you have a high fever, or you have ketones in your urine. Dehydration from vomiting or infection can lead to diabetic ketoacidosis. Ketones in the urine is an early indicator that this may be a concern.

HYPERGLYCEMIA

It refers to elevated blood glucose level fasting level - > 110 mg/dl; 2 hrs postprandial level >140 mg/dl.

Clinical manifestations

- Increased urination
- Weakness
- Blurred vision
- Headache
- Nausea and Vomiting
- Abdominal cramps.

Management

- Consult physician.
- Continuance of diabetes medication as ordered .
- Frequent checking of blood and urine specimen and recording of results.

LONGTERM COMPLICATIONS

Macrovascular complications

- Coronary artery disease
- Cerebro vascular disease
- Peripheral vascular disease

Micro vascular complications

Diabetic retinopathy Diabetic nephropathy Diabetic neuropathy

Preventing complications of diabetes mellitus

Complications include,

- Cataracts
- Damage to blood vessels that supply the legs and feet (peripheral vascular disease)
- Diabetic retinopathy (eye disease)
- Foot sores or ulcers, which can result in amputation
- Glaucoma
- High blood pressure
- High cholesterol
- Kidney disease and kidney failure (diabetic nephropathy)
- Macular edema
- Nerve damage, which causes pain and numbness in the feet, as well as a number of other problems with the stomach and intestines, heart, and other body organs
- Stroke
- Worsening of eyesight or even blindness
- Erection problems
- Infections of the skin, female genital tract, and urinary tract

Contact a Medical Professional if you have

10. Chest pain or pressure
11. Fainting or unconsciousness
12. Seizure
13. Shortness of breath
14. Numbness, tingling, pain in your feet or legs
15. Problems with your eyesight
16. Sores or infections on your feet
17. Symptoms of high blood sugar (being very thirsty, having blurry vision, having dry skin, feeling weak or tired, needing to urinate a lot)
18. Symptoms of low blood sugar (weak or tired, trembling, sweating, feeling irritable, unclear thinking, fast heartbeat, double or blurry vision, feeling uneasy)

These symptoms can quickly get worse and become emergency conditions (such

as convulsions or hypoglycemic coma).

LEVELS OF PREVENTION

Primary prevention

- ✓ Initiate eating habits based on the food pyramid in school age children.
- ✓ Promote avoidance of food high in refined sugars and saturated fats.
- ✓ Maintenance of ideal body weight starting in childhood.

- ✓ Perform regular exercise and follow healthy lifestyle.
- ✓ It is importance to return to pre-pregnancy weight or ideal body weight postpartum.

Secondary prevention

- ✓ Screen high risk individuals: people with first degree relatives with type 2 diabetes mellitus, obese individuals, members of high risk races, people older than 40 years with any other risk factor, individuals with hypertension and or hyperlipidemia, those with previous Impaired glucose tolerance, women with previous Gestational diabetes mellitus or a history of a baby weighing > 9 lb, and individuals with a history of recurrent infections.
- ✓ Perform periodic assessment to determine clients learning needs.
- ✓ Perform periodic examinations to assess glycemic control and screen for complications of diabetes. Utilize strategies shown to reduce complications of diabetes by team made up of healthcare providers and individuals with diabetes mellitus.
- ✓ Prevent hypoglycemia or hyperglycemia with stress or exercise by closely monitoring blood glucose levels and taking action.
- ✓ Perform daily foot care

Tertiary prevention

- ✓ It is important to maintain the blood glucose levels to within as normal levels as possible.
- ✓ Follow the diabetic diet and exercise program to reduce obesity.
- ✓ It is a must to control of coexisting risk factors, such as hypertension and hyperlipidemia. No smoking.
- ✓ Avoidance of nephrotoxic drug, such as Non steroid anti inflammatory drugs is very important.
- ✓ Ensure prompt treatment of any foot abrasion or infection.
- ✓ Routinely have a follow-up to assess for complications of diabetes mellitus.

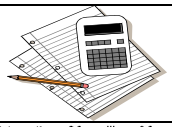
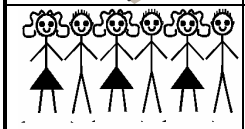
“ ARISE, AWAKE, STOP NOT TILL YOU REACH THE GOAL “

Swami vivekananda

Goals for self management of diabetes mellitus

Diabetes is a very serious disease which may cause damage to the blood vessels and nerves leading to the brain, eyes, heart, kidneys, toes and feet.

The following goals will help you gain and maintain diabetic control to reduce damage to your blood vessels and nerves.

	<u>Goal 1:</u> I will work hard to keep my HbA1c below 7.
	<u>Goal 2:</u> I will exercise (walk) 30 minutes ____ days per week. If I notice chest pain, shortness of breath or chest tightness, I will seek medical attention.
	<u>Goal 3:</u> I will check my feet daily. If I notice a sore or irritation I will seek medical attention. I will visit the Podiatrist yearly, or as instructed.
	<u>Goal 4:</u> I will follow my diabetic and low fat diet to reduce my blood sugar and cholesterol.
	<u>Goal 5:</u> I will try to obtain my ideal body weight. I will lose ____ pounds by my next office visit.
	<u>Goal 7:</u> I will stop smoking.
	<u>Goal 8:</u> I will have an eye exam and dental check-up every year or as indicated.
	<u>Goal 9:</u> I will check my blood sugar as instructed and will call if the results are consistently below 70 or above 180.
	<u>Goal 10:</u> I will talk about how I feel about having diabetes to family, friends, & or chaplain. I will attend the Diabetes Support Group.

Patient's Name: _____
MR No. : _____